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# Research *in* Agriculture

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LOUISIANA

ANNUAL REPORT  
1943 - 1944

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W. G. TAGGART, DIRECTOR  
EXPERIMENT STATIONS





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# Research in Agriculture

LOUISIANA

1943-1944



## ANNUAL REPORT



AGRICULTURAL EXPERIMENT STATION

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

BATON ROUGE, LOUISIANA

W. G. TAGGART, *Director*



*Compiled and Edited by I. L. Forbes from Reports of Heads of  
Departments and Project Leaders*

*Year Ended June 30, 1944*



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## Letter of Transmittal

Baton Rouge, Louisiana

April 1, 1945

Governor James Houston Davis

Baton Rouge, Louisiana

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1944, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states.

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C., and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. TAGGART, Director

Louisiana Agricultural Experiment Station

329509



## Members of Experiment Station Staff Called to the Colors



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Charles C. Cain  
Fred D. Cochran  
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SOUTHEAST LOUISIANA STATION, FRANKLINTON

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K. L. Cockerham, M.S., Entomologist  
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<sup>a</sup>Part-time teaching

<sup>b</sup>On military leave

<sup>c</sup>Transferred

<sup>d</sup>On leave of absence

<sup>e</sup>Appointed after July 1, 1943

<sup>f</sup>Resigned

<sup>g</sup>On military leave; reported killed in airplane crash, January 2, 1944

<sup>h</sup>Deceased, April 8, 1944

# *Agricultural Chemistry and Biochemistry*

## *Nutrition Research Division*



### **Vitamin A Content of Milk and Butter . . . E. A. Fieger and Harvy Lewis**

Analyses of 27 herd samples and six creamery samples of milk received monthly showed that the vitamin A content was lowest during the winter months of November, December and January, averaging during this period 927 International Units of vitamin A per quart of milk containing 3½% butterfat. From this low value the content of vitamin A increased sharply, reaching a maximum average value of 2218 International Units per quart of 3½% milk in April, and then decreased to a second minimum value in July which was slightly higher than the winter low, averaging 1026 International Units per quart of 3½% milk. A fall maximum occurred in September and October; milk produced during these two months averaged 1665 International Units per quart of 3½% butterfat milk.

### **Supplemental Oat Pasture and Clover Pasture Increase the Vitamin A Content of Milk**

A comparison of the effect of grazing of dairy cows on oat, clover and native pastures upon the vitamin A content of milk was made during the winter and spring of 1943-44. The results obtained are given in Fig I. The total vitamin A content was determined in International Units per quart of milk as received and the results adjusted to International Units per quart of milk containing 3½% butterfat.

From Fig. I it will be seen that oat pastures caused the following increases in Internatinal Units of vitamin A per quart when compared to native pastures:

Nov.	Dec.	Jan.	Feb.	Mar.	April
166	655	286	304	495	439

These increases through the use of oat pastures not only resulted in raising the vitamin A quality of the milk from fair to excellent, but also increased the milk production per cow.



The value of clover pastures in increasing the vitamin A content of milk, as shown in Fig. I, resulted in the following increases when compared to native pastures:

Feb.	Mar.	April
206	404	287

By having available supplemental oat pastures and improved clover pastures Louisiana dairy farmers, besides being assured of ample forage, will be supplying milk of good to excellent quality during the period October through April, or during the period when cows on native pasture are producing milk of lowest vitamin A quality.

### **Creamery Butter Produced in Louisiana Contains High Amounts of Vitamin A**

Creamery butter is being received monthly from two butter manufacturers whose production accounts for two-fifths of the state's creamery butter production. The monthly average vitamin A content expressed in International Units, per pound, was as follows:

Year	Jan.	Feb.	Mar.	April	May	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943								16,102	15,480	9,671	10,238
1944	8,077	11,096	17,325	19,440	15,565	17,990	14,533	14,917	16,851	12,055	10,240

Since the average prewar consumption of butter per person was 18 pounds per year or 0.8 oz. daily, winter butter supplies daily, on this basis, 500 International Units or one-tenth an adults daily need, while butter produced during the remainder of the year will supply 825 International Units or one-sixth the daily need.

### **Ascorbic Acid Value of Home Canned Tomatoes and Raw Collards . . . Martha E. Hollinger**

Home canned tomatoes were collected from house wives through the cooperation of the home demonstration staff of the Agricultural Extension Division. The ascorbic acid values of 100 samples were determined approximately one year after canning. Values ranged from 3 to 34 milligrams of ascorbic acid per 100 grams of tomatoes. No statistically significant differences were found in the ascorbic acid value of samples processed in the hot water bath, those canned by the hot pack method, and those processed under pressure. Tomatoes canned in tin cans had significantly higher ascorbic acid values than those canned in glass.

International Units per quart 3½ % milk.

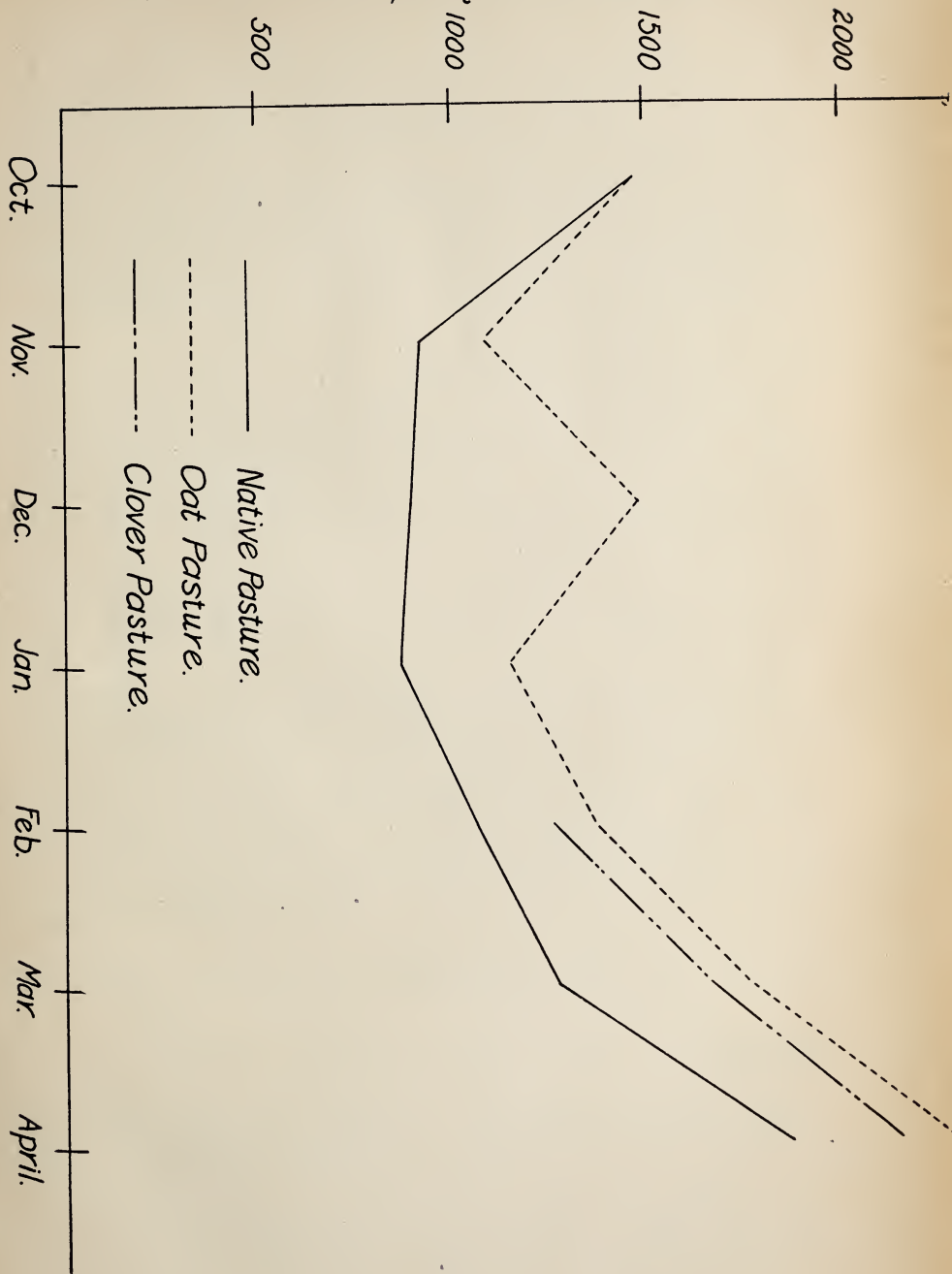


Fig. 1

Freshly harvested raw collards of the Louisiana Sweet variety contained from 122 to 237 milligrams of ascorbic acid per 100 grams. The average value for 13 determinations on separate days was 169 milligrams. The ascorbic acid content of the Zimmerly variety ranged from 134 to 176 milligrams per 100 grams. The average for six determinations on this variety during the early part of the season was 154 milligrams.

Results of cooking studies showed 72 per cent retention after cooking for 45 minutes in minimum water and 24 per cent retention after cooking three hours in minimum water. The use of salt pork in cooking had no significant effect on ascorbic acid destruction.

## **Dehydrated Sweet Potatoes**

In cooperation with the Quartermaster Corps of the United States Army and the Horticulture Department of this Experiment Station, the ascorbic acid and carotene values of canned dehydrated sweet potatoes are being studied in relation to methods of packing, treatment in blanching, and variety.

### **Ascorbic Acid . . . Martha E. Hollinger and Leona Johns**

Dehydrated sweet potatoes packed under vacuum have shown higher ascorbic acid values, lower moisture content, and slightly better flavor than those packed under nitrogen, carbon dioxide or air. Packing under sulfur dioxide gas produced a product of superior color but noticeable sulfur dioxide flavor. Ascorbic acid values have decreased after six months of storage. Storage temperature of 110°F. caused greater decrease than 90°F. The ascorbic acid values of samples stored at room temperature have decreased more rapidly during summer months. Varieties have differed in their retention of ascorbic acid during dehydration.

### **Carotene . . . Harvye Lewis and Janis Gibbens**

Sweet potatoes dehydrated and packed soon after harvesting showed a higher initial carotene value than those dehydrated later in the season. The amount of carotene decreased after eight months when the cans were stored at 90°F., 110°F., or room temperature. After eight months of storage, those packed under air showed the greatest carotene loss. There was little difference in the losses from dehydrated sweet potatoes packed under vacuum, nitrogen, carbon



dioxide and sulfur dioxide. Varieties studied may be ranked according to carotene content in the following order: L64, L156, L126, L12, L155, and Porto Rico — Unit 1.

## **The Detoxication of Tung Meal . . . Jordan G. Lee**

The toxicity of tung meal has prevented its utilization as a feedstuff. This study has as its object the detoxication of tung meal so that its feed value may be determined. Two types of meal have been studied: (1) A commercial expeller meal from the mill of L. O. Crosby and Sons; (2) A meal prepared from tung nuts by extraction of the oil with Skellysolve B. This solvent extracted meal was prepared by the United States Department of Agriculture Tung-Oil Laboratory. Chicks have been used as test animals because they are very sensitive to the meal. The meals have been incorporated into mixed diets at a 20% level. Mortality and growth rates have been used as indices of toxicity.

The expeller meal causes some deaths and markedly depresses growth. Steaming this meal decreases the toxicity. Moistening the meal before steaming increases the effectiveness of the process. Steaming for more than one hour is no more effective than for one hour. Chicks receiving the meal which was moistened and then steamed for one hour grow well but do not quite equal those on a good stock ration. Whether this difference is due to residual toxicity or to lower food value of the tung meal is not known at present; palatability is not the cause of the difference.

The solvent extracted meal is highly toxic and gives 100% mortality. Heat alone decreases the toxicity only slightly. Best results have been obtained with a sample first extracted with alcohol and then steamed. This meal gives growth rates well below normal and causes some deaths, however.

## **The Toxic Principles of the Tung Nut . . .**

James A. Watson, Jr., and Jordan G. Lee

This study has as its object the isolation and identification of the toxic principle or principles of the tung nut. It was begun because such knowledge might materially aid in the development of a process for the detoxication of commercial tung meals.

Extraction in vacuo of a solvent extracted tung meal obtained from the United States Department of Agriculture Tung-Oil Laboratory with ethyl alcohol and acetone yields highly toxic extracts. In all cases the toxicity is determined by force feeding the test ma-

terial to chicks. A water extract is non-toxic. A diethyl ether extract is only slightly toxic. The residual meals are all highly toxic. Tung oil expressed in this laboratory from tung nuts is more toxic than an oil extracted with diethyl ether, neither being very toxic, however. The meal remaining after extraction with alcohol loses a great deal of its toxicity upon steaming, although before such extraction steaming has little or no apparent effect. The alcohol extract is apparently not affected to any great extent by heating. These results seem to indicate that there are at least two materials in tung nuts which are toxic.

## **Enriched Rice . . . E. A. Fieger and Virginia R. Williams**

Work on the rice enrichment program for the past year centered on the large scale fortification of white rice with thiamine and niacin. This enriched rice is being packaged and placed on the retail market to determine consumer acceptance of an enriched rice product.

## **Growth Stimulants for the Microbiological Biotin Assay . . . Virginia R. Williams and E. A. Fieger**

The microbiological determination of biotin (using *Lactobacillus casei*) has been investigated from the standpoint of growth stimulants. The lipid nature of such interfering factors in rice polish was established by comparing extracts that had been treated by filtration, ether extraction, enzyme digestion, etc. Methods for the obviation of the stimulating effect have been devised. Various supplements to the basal medium were tested but none found worthy of recommendation. Lecithin, mineral oil, oleic acid, whole rice oil, and the unsaponifiable fraction of rice oil were compared as to extent of stimulation produced. In tubes showing high acid and cell production in the presence of basal medium and rice oil without added pure biotin, no evidence of biotin synthesis could be demonstrated.

# *Agricultural Economics*



## **Farmers' Cooperative Business Associations . . .**

B. M. Gile and J. M. Baker

In a survey conducted during the fall and summer months of 1944, 145 local or district farmers' cooperative business associations were found in Louisiana. Among the local units, six were in process of organization and seven were reported by officers as temporarily inactive, leaving 132 that were active in 1944. In addition there were five state-wide organizations of the centralized, or federated type, which usually serve farmers through the local units. The local associations reported 36,000 members and 5,060 other patrons who had not satisfied all the requirements for voting members.

The data given above do not include several group organizations, cooperative in nature, whose functions are largely educational and promotional from a public service point-of-view. The data refer specifically to cooperative associations of farmers engaged in processing or marketing the products grown by them and in purchasing or manufacturing supplies used by them in the production process. In general, the associations reported are incorporated, have a Board of Directors, an established place of business, and operate on the basic cooperative principles of one vote per member; limited returns on capital investment, and the distribution of surpluses in proportion to the amount of patronage. Farmers' cooperative credit associations were not included in the 1944 survey.

The distribution of Farmers' business organizations is shown on the following outline map of Louisiana. Each black dot represents the established office location for one association. In the case of all state-wide organizations and also for many of the local or district associations, the membership is not confined to the particular parish in which the main office is located. Farmers' cooperative business associations are found in all parts of Louisiana, but they are more numerous in the sugarcane, rice, strawberry, and truck crop areas than in those areas where cotton is the main cash crop.

Thirty-three different points were found where cotton was marketed cooperatively in 1944. The volume of cotton marketed by most of the associations is small, but the fact that the cooperative outlets exist, tends to narrow the margin between the local and the central

# FARMERS' COOPERATIVE BUSINESS ASSOCIATIONS 1944



cotton markets. There were 16 points where cooperative outlets for potatoes were found, 13 for miscellaneous truck crops, ten for strawberries, eight for raw sugar and molasses, seven each for rice and for poultry products, and five for wool. Although only three active milk marketing associations were found, their influence is widespread. The bargaining agency for milk producers in the New Orleans milkshed is located at Kentwood, has 2,000 members and is serving its members efficiently. The milk association in the Monroe milkshed operates truck routes to assemble the milk from producer members in several parishes and has been highly successful in reducing the price margin between the farmer and the consumer. The association of milk producers at DeRidder is small, but it has benefited not only its members but also the consumer by providing a supply of whole milk that has been pasteurized.

Developments in the field of processing farm products are relatively new, but have been generally successful. Processing plants require a larger investment of capital than is found in most associations organized only for marketing purposes. There are eight cooperative mills for processing cane and manufacturing raw sugar and the same number of cooperative cotton gins. The cooperative gins usually market cottonseed but not the cotton lint. One drying plant for rough rice operated at Sulphur, Louisiana, and two additional



drying plants were constructed in 1944. All but one of the six freezer-locker plants found were in process of organization and construction. There is a cooperative tung oil crusher and refinery at Covington, and a cooperative cottonseed oil press and refinery at Washington in St. Landry Parish.

In the field of farm supplies, fertilizers and seeds were most frequently purchased cooperatively. There were 13 associations engaged in the construction of transmission lines and furnishing electric current to farmers. The cooperative farmers' electric power associations are providing electric current to 15,654 rural families which enables them to enjoy the conveniences of electric lights, refrigerators, and other household and farm equipment run by electric power. Five cooperative rice irrigation systems were found in use in Allen Parish. The irrigation associations receive the customary share of the rice produced, and partly because of wartime prices for rice, their financial progress has exceeded expectations.

## **Cotton Marketing . . . James F. Hudson**

For the past six years, a free classing and market news service for cotton has been available to farmers who become members of cotton improvement groups. This service is provided for by a federal law commonly known as the Smith-Doxey Act. The purpose of the program is to furnish the cotton farmer information as to the grade, staple, and preparation of each bale of cotton produced and this together with market price information enables him to sell his cotton on the basis of its grade and staple. It gives the farmer an incentive to plant the better varieties of cotton and to follow the practices necessary to produce cotton of higher quality. Since the beginning of the program the Commodity Credit Corporation has accepted Form 1 classification as evidence of the grade and staple length of cotton for loan purposes, and during the 1944-45 season, if samples were taken by bonded samplers, they were accepted for the cotton purchase program. The Louisiana Agricultural Experiment Station cooperates with the War Food Administration in carrying out the program in Louisiana.

During the 1939-40 season there were only 900 bales of cotton, 0.1 per cent of the total state ginnings, classed for eligible groups of farmers in Louisiana. There was an annual increase in the number of bales and the percentage of state ginnings classed through the 1941-42 season, reaching a peak of 30,582 bales, or 9.9 per cent of the total state ginnings. During the 1942-43 season the percentage of total state ginnings classed decreased to 7 per cent. This decrease was

caused by dissatisfaction among group members as to the reliability of the classing service rendered by the government. The classing service was improved greatly during the 1943-44 season, but only 6.8 per cent of the state ginnings were classed. During the 1943-44 and 1944-45 seasons the improved service did much to revive the confidence of the farmers in the reliability and correctness of the government classing. By January 1, 1945, 61,486 bales of the 1944-45 crop had been classed, or 9.9 per cent of the estimated total production for the year.

The Smith-Doxey free classing program is now operating on an efficient basis in Louisiana and is of great value in enabling farmers to sell their cotton for what it is worth. The number of farmers taking advantage of the service should increase rapidly.

## **Milk Marketing in Wartime . . . William H. Alexander**

In June, 1944, a study of the milk delivery system in the Lafayette, New Iberia and Lake Charles Milkshed was undertaken to effect economics in transporting milk from farms to market. This work was undertaken at the request of the Office of Defense Transportation. More efficient assembly and distribution of milk is desirable both from the standpoint of aiding the war effort by conserving trucks, tires and gasoline, and by helping the dairy industry to meet probable post-war competitive conditions.

A map was prepared showing the location of the dairy farms and proposed route changes in the delivery system to reduce the miles of travel in transporting milk from farms to concentration points. The proposed changes were accepted by the O. D. T. officials. As a result of the survey, nineteen trucks operated by individuals who hauled only their own milk to market, were replaced by two truck operated by milk dealers.

Wholesale raw milk production in Southwest Louisiana for the first seven months of 1944 was less than that recorded in the same period for 1943. However, rail shipments of milk into the area trended upward during the same period.

In Lafayette, Louisiana, where the greatest volume of milk in the area is concentrated, three different ceiling prices were found to be in operation. This situation resulted from dealers with headquarters in other price zones operating cooling stations in Lafayette. When the price control act went into effect, the ceiling price for wholesale raw milk (4 percent) was set at \$3.95 per hundredweight in Lake Charles. The ceiling price for the same quality of milk in New Iberia was set at \$3.72 and in Lafayette, \$3.55 per hundredweight. Dealers

located in each of the price zones operated cooling stations in Lafayette and paid the ceiling price prevailing at their headquarters, with the exception of 30c per hundredweight to be deducted from the Lake Charles price for transportation. To further complicate the problem of price inequities, milk producers have not been allowed to change from the dealer with the lower price to the dealer with the higher price, which results in some farmers in Southwest Louisiana being handicapped by price inequities under the present price control system.

## **The Poultry and Egg Market at New Orleans . . .**

J. M. Baker

New Orleans with a population of more than one half million is an important market for poultry products. To this large consuming center Louisiana producers and dealers look for an outlet for their poultry and eggs.

A study of New Orleans as a poultry market was completed in 1944, covering the period 1931 to 1943. The total yearly receipts of poultry at New Orleans in 1940 was 7.2 million pounds of which hens constituted 57 per cent. Receipts are largest during the second quarter of the year and smallest in January and February. During the period 1931 to 1943, wholesale prices of hens averaged the highest in April at 18.1 cents and were lowest in July at 15.9 cents a pound.

Springs and broilers on the New Orleans market are classed together as young chickens and prices are quoted on this classification. Receipts of young chickens comprise about 37 percent of the total supply. Receipts of springs are largest in the third quarter of the year and of broilers in the last quarter. The prices of young chickens during the period were highest in April and lowest in September and averaged 26.3 cents and 17.1 cents per pound respectively. Roosters at New Orleans usually bring about 5 cents a pound less than hens and quotations on capons are low and irregular.

New Orleans is a good market for turkeys with the yearly receipts slightly under one million pounds. Receipts are highest during the last quarter of the year. Supply and price are both high at the same time due to seasonal demand. The price of toms is from one-half cent to one and a half cents a pound below the price of turkey hens. Geese and ducks constitute less than one percent of the supply of poultry. The average price of geese ranged from 12 cents a pound in January to 10.1 cents in August and September and duck prices were slightly higher.

Egg prices at New Orleans are quoted regularly only on current receipts or ungraded lots. Egg production in the New Orleans trade

area is seasonal and this causes wide variation in monthly prices. The highest average wholesale price for the 13-year period was in December at 28.2 cents a dozen and the lowest average price in June at 16.8 cents. Grade A eggs at the wholesale markets command a premium of about 3 cents a dozen. For details, see Louisiana Agricultural Experiment Station Bulletin No. 385, entitled "Poultry and Egg Prices at New Orleans" by J. M. Baker.

## **Wartime Production Capacity on Louisiana Farms . . .**

Leo J. Fenske and B. M. Gile

The Louisiana Land-Grant College Committee, composed of representatives of the Experiment Station, Agricultural Extension Division, and United States Department of Agriculture, reviewed the farm production situation in Louisiana and suggested a pattern and level of production for 1945 in each type of farming area in Louisiana. The purpose of the study was to currently analyze the adjustments necessary in the use of land, capital and labor resources in order to maximize the production of food, fiber and oil needed to help win the war. The data in the report were used by the State War Board, the A. A. A. and the Agricultural Extension Division as a guide in establishing production goals for 1945. The recommendations by areas are too voluminous to report here, but are available in Mimeographed Circular No. 44 and a copy of the report will be sent upon request.

## **Cost and Returns of Operating Large Sugar Cane Farms and Sugar Mills in Louisiana, 1942 . . .**

Roy A. Ballinger and William H. Alexander

### **1. Large Sugar Cane Farms**

The total cost per ton of producing sugar cane on large farms was higher in 1942 than in any other recent year, except 1940. Because of higher prices for cane, both net operating income and net income per ton of cane were higher than in any of the five previous years.

### **2. Sugar Cane Mills**

The total cost per ton of cane ground was higher in 1942 than in any of the previous five years. This was primarily the result of a higher price paid for cane, although general overhead and manufacturing costs were also relatively high. Both net operating income and net income per ton of cane ground were lower in 1942 than in 1941, but were well above the average for the four years 1937 to 1940.



Net operating income was 12 cents lower per 100 pounds of sugar manufactured in 1942 than in 1941, but it was 33 cents higher than the average for the years 1937 to 1940.

## **Prices and Statistics\* . . . J. P. Montgomery**

Prices received by Louisiana farmers for major agricultural commodities have increased materially since the United States entered World War II. The general agricultural products price level in 1918-19, the last year of World War I, was 50 percent higher than the average for the five year period August 1924 through July 1929. By 1938-1939 the price level had declined to 56 percent of the 1924-1929 average. The price level rose slightly through the next two years to 60 percent of the base in 1939-40 and to 67 percent in 1940-41. By 1942-43, under the impact of all-out war demand, the price level rose to 122 percent of the base period and further to 130 percent in the 1943-44 crop year. There was a tendency for prices of some farm products to weaken during 1944.

### **Beef Cattle and Corn Prices**

Beef cattle prices were lower during 1944 than in 1943, while corn prices were higher each month than for comparable months of 1943. Prices of cattle and corn have placed cattlemen, who depend upon corn rather than forage as a main source of animal feed, in a more unfavorable position during 1944 than in 1943. Livestock producers in Louisiana have a distinct advantage over corn belt producers in that livestock can obtain a much higher percent of their feed from pastures due to the comparatively short, mild winters in Louisiana. In January 1943, 100 pounds of liveweight beef cattle sold for the same, in Louisiana, as 9.9 bushels of corn; as compared with this 100 pounds of liveweight beef cattle in January, 1944 sold for the same as only 6.6 bushels of corn. This beef cattle-corn price ratio remained fairly stable during 1944, the highest being 100 pounds of beef cattle being equal in value to 7.0 bushels of corn and the lowest, 100 pounds equal to 6.0 bushels. There was a continual decline in 1943 from 100 pounds of beef which was equivalent in value to 9.9 bushels of corn in January, to 100 pounds equal in value to 6.4 bushels in December.

### **Hog-Corn Price Ratio**

In January 1944, 100 pounds of liveweight hogs sold for the same as 7.7 bushels of corn as compared with 100 pounds which was equal

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\*Basic price data are obtained through a cooperative agreement between the Louisiana Office of the Division of Agricultural Statistics, Bureau of Agricultural Economics, U.S.D.A. and the Agricultural Experiment Station.

in value to 12.5 bushels in January 1943. At no time during the year 1944 did the ratio exceed 100 pounds equal to 7.0 bushels. Since a common estimate is that it requires ten bushels of corn to increase the weight of fattening hogs 100 pounds, recently prevailing price relationship will lead to further declines in pork production in Louisiana.

### **Egg-Chicken Feed Prices**

Louisiana farmers received, in January 1944, for one dozen eggs the same amount of money that they paid for 12 pounds of laying mash as compared with one dozen equalling 11.8 pounds a year earlier. This ratio declined through February, March, and April 1944, when the ratio was one dozen eggs equal in price to six pounds of laying mash. After April, the position of egg producers grew progressively better until December when one dozen eggs could be exchanged for 12.7 pounds of laying mash.

### **Milk-Feed Price Ratio**

One hundred pounds of milk sold for the same amount of money as was required to purchase 112 pounds of 24% dairy ration in January 1944. This was a decline of 13 pounds in the amount of feed that 100 pounds of milk would purchase a year earlier. The price ratio was less favorable for dairymen during each month of 1944, than for comparable months of 1943. If the averages for the two years are taken, it is found that dairymen received from the sale of 100 pounds of milk enough to buy 107.1 pounds of 24% dairy ration in 1944, as compared with enough to buy 115.4 pounds in 1943.

### **Monthly Farm Wages**

Monthly farm wages in Louisiana, with board, rose 18 percent from October 1943 to October 1944. Monthly farm wages with board rose 133 percent from October 1939 to October 1944. Monthly wages without board rose 16 percent from October 1, 1943, to October 1, 1944, and 121 per cent from October 1939 to October 1944.

### **Daily Farm Wages**

Daily farm wages with board rose 17 percent from October 1, 1943, to October 1, 1944. The increase in daily wages with board from October 1939 to October 1944 was 162 percent. The increase in daily farm wages without board rose 16 percent from October 1, 1943, to October 1, 1944. Daily wages without board rose 136 percent from October 1939 to October 1944.

# Farm Ownership Under the Program of the Farm Security Administration . . . Willie Mae Alexander

The Federal Tenant-Purchase program, supervised by the Farm Security Administration, began operation in Louisiana in 1937. The primary purpose of this program is to assist worthy tenants to become farm owners. During 1944 a survey of all the farms purchased under the program prior to May 1, 1944, was made in Bienville, Claiborne, Jackson, Lincoln, and Union parishes located in the upland cotton section of Northern Louisiana and in Acadia and Vermilion parishes located in the rice area of Southwestern Louisiana. In the upland cotton parishes loans had been made for 40 farms and in the rice parishes for 46 farms.

The average size of the farms purchased in the upland cotton area was 100 acres with 53 acres in cultivation. The land in farms ranged from 60 to 160 acres and the amount in cultivation from 30 to 100 acres. In the rice area the average farm was 130 acres with 117 acres in cropland; the smallest farm being 37 and the largest 269 acres with the cropland varying from 32 to 256 acres.

The buildings and improvements provided for in the Farm Ownership loan agreements had been completed on 85 percent of the units in the upland cotton area and on 70 percent of those in the rice area. The total cost of farms with added improvements in the upland area varied from \$2,597 to \$5,422 and averaged \$3,829. In the rice area the cost of farms varied from \$4,720 to \$14,380 with an average of \$8,883. The average cost of the various items and the percentage spent for each is shown in Table 1.

TABLE 1. — AVERAGE COST OF REAL ESTATE, ALL T. P. UNITS ON WHICH IMPROVEMENTS WERE COMPLETE, FEBRUARY 1, 1944, SELECTED PARISHES, TWO AREAS, LOUISIANA

Real estate items	Upland cotton area		Rice area	
	Average cost	Percent of total cost	Average cost	Percent of total cost
	Dollars	Percent	Dollars	Percent
Farm real estate as purchased	1,880.75	49.1	6,129.66	69.0
Acquisition fees	22.86	0.6	26.38	0.3
Improvements added:				
Dwelling	1,253.28	32.7	1,770.46	19.9
Barn	365.89	9.6	383.85	4.3
Other buildings	87.84	2.3	149.59	1.7
Water supply	57.44	1.5	116.70	1.3
Fences	151.59	4.0	260.52	3.0
Land and other improvements	9.30	0.2	45.87	0.5
Total	1,925.34	50.3	2,726.99	30.7
Total for real estate	3,828.95	100.0	8,883.03	100.0

Preliminary results for those who had completed the improvements on their units showed the average amount borrowed per farm

in the five upland parishes to be \$3,762 as compared to \$8,327 in the two rice parishes. The smallest loan made in the cotton area was \$2,505 and the largest loan \$4,786, as compared with a range from \$4,576 to \$11,800 to the same group of borrowers in the rice area.

In addition to the borrowed funds, the operators in the upland area used an average of \$66.79 of their individual savings in defraying the cost of real estate. This amounted to 1.7 percent of the total cost. In the rice area an average of \$555.92 or 6.3 percent of the total cost was supplied by the borrowers.

## **Wartime Increases Farm Costs of Production . . .**

J. Norman Efferson

### **1. Milk Production Costs Before and During the War**

The cost of producing milk in the Southeast Louisiana or Florida Parishes dairy area was more than twice as high in 1944 as in the pre-war year, 1938. Total expenses on the group of representative farms studied averaged \$2.18 per hundred pounds of milk produced in 1938; \$2.91 in February, 1942; \$3.55 in January, 1943; \$4.21 in August, 1943; and \$4.65 in August, 1944.

Costs increased steadily from 1941 to 1943 and at an even more rapid rate during 1943 and 1944. The most important factors causing this increase in expenses for milk production were the increased prices for dairy feeds and the higher costs for hired farm labor. From January, 1943, to August, 1944, the price of cottonseed meal increased from \$2.20 per hundred pounds to \$2.90; soybean meal from \$2.50 to \$3.20; crushed corn from \$1.80 to \$3.00; and ground wheat from \$2.40 to \$3.20. In addition, local shortages of cottonseed meal and corn meal, the two feeds most commonly used by the dairymen in the region, have forced the dairymen to use substitute feeds of lower feeding value but higher in price, thus causing further increases in total costs and in many cases reductions in the production rates of the dairy cows.

The price received by farmers for milk in this area has not increased as rapidly as costs, although direct governmental subsidies to the milk producers, started in 1943 and continued in 1944, have partially offset the increase in costs. If costs continue to increase, or if costs remain stable at the 1944 levels and the governmental subsidy is suddenly reduced or eliminated, an immediate and severe shortage of milk for the New Orleans milk marketing area can be expected to occur.

### **2. Family-type Sugar Cane Farms**

Detailed records of expenses and receipts from 500 family-type sugar cane farms in Louisiana were obtained for the 1938 crop year,



453 in 1940, 467 in 1942, and about 100 in 1943. The cost of growing, harvesting, and marketing a ton of sugar cane on the farms studied, not including a charge for the value of the operator's labor, averaged \$3.78 per ton in 1938, \$5.05 in 1940, \$4.38 in 1942, and \$4.59 in 1943. The difference in cost from 1938 to 1940 was due to variations in average yields obtained; the increased costs in 1942 and from 1942 to 1943 was due to the higher prices paid for input items, mainly machinery and hired labor, under war-time conditions.

Returns from sugar cane averaged about \$3.70 per ton in 1938 and 1940, \$5.24 in 1942, and \$5.76 in 1943. The net return to the average farmer to pay for his years work on the farm amounted to a loss of \$2.00 per acre of sugar cane in 1938, a loss of \$18.00 per acre in 1940, a gain of \$15.00 per acre in 1942, and a gain of \$25.00 per acre in 1943. In terms of the return per hour of labor on the farm, these farmers incurred a loss of about eight cents per hour in 1938 and 1940 and earned about forty cents per hour in 1942 and 1943.

### 3. Rice Production Costs

Average costs of producing rice on 52 representative farms in the Louisiana rice area varied from \$51 in 1941 to \$61 in 1942, \$72 in 1943, and \$78 in 1944. Increased costs under war-time conditions, especially for hired farm labor and for machinery maintenance and repairs, caused total expenses per unit to go up more than 50 per cent during the four-year period.

Average costs per barrel were \$4.96 in 1941, \$5.77 in 1942, \$6.77 in 1943, and \$7.46 in 1944. These producers received an average price for all rice sold of \$5.33 in 1941, \$6.18 in 1942, \$6.53 in 1943, and \$6.03 in 1944. The final result is a net profit of about forty cents per barrel in 1941 and 1942, a loss of about twenty-five cents per barrel in 1943 and a loss of more than one dollar per barrel in 1944.

Included in the total costs are the costs of all hired labor at the rate actually paid and a charge for all the labor of the farm operator and the members of his family at the rate the farmer would have had to pay if this unpaid labor had been hired. If these unpaid labor charges are omitted from the computations, then the resulting net income represents what the farmers actually earned for their own labor. On this basis, the return per hour of labor on the rice enterprise averaged 25 cents in 1941, 31 cents in 1942, 27 cents in 1943, and 12 cents in 1944. These returns per hour indicate the relative average returns in relation to the costs of hired farm labor and point out that in any case where a farmer had to pay a higher rate for labor than the indicated earnings, then he was losing money or reducing his hourly earnings by doing so.

#### 4. Irish Potatoes

Total direct cash costs for producing an acre of Irish Potatoes in the commercial potato region of Louisiana averaged about \$80 per acre in 1942, \$95 per acre in 1943, and \$115 per acre in 1944, or an increase of almost 50 per cent from 1942 to 1944. Overhead costs have remained relatively stable, averaging from \$22 to \$24 per acre during the same period.

The average cost of producing 100 pounds of potatoes, including all grades, varied from \$2.38 per hundredweight in 1942 to \$3.21 in 1944. There has been a steady year-by-year increase in most of the items of cost, with greatest increases occurring for man labor and seed potatoes, which are the two most important items of cash expense. Estimates made by these same growers place the expected 1945 cost of producing early potatoes at \$146 per acre or \$3.39 per hundred pounds.

# *Agricultural Engineering*



## **Sugarcane Machinery . . . Harold T. Barr**

Controlling weeds and grasses in sugarcane by flame was successfully carried out with some seventy-five machines during the 1944 season. Two machines using Butane and Propane were successfully used on summer plant sugarcane. These machines are to be further improved and used during the 1945 season.

Drainage ditch weed and grass removal was successfully accomplished by using a large volume high temperature burner three or four times in a season.

A light weight drag line attachment for a 40 H. P. crawler tractor was used for removing sediment from small canals and lateral drainage ditches. An attachment for pulling the bucket parallel to the ditch prevents disturbing the sides and aids in maintaining a uniform grade and straight ditch. The machine can be used as a loader, or the drag line attachment can be removed and the standard 40 H. P. Diesel tractor will be ready for other drawbar jobs.

## **Sweet Potato Machinery and Dehydration . . .**

Leland E. Morgan and Harold T. Barr

Mechanical potato diggers have been successfully used for the past two seasons to harvest sweet potatoes for the fresh market as well as for storage for seed. Harvesting studies in the fall of 1944 indicated that the mechanical harvester is a more efficient machine than the commonly used small turning plow.

Yield data from plots harvested with a middle breaker, turning plow, and mechanical digger gave the following results:

Method of Harvesting	Middle Breaker	Turning Plow	Mechanical Digger
Marketable potatoes bushels/acre	93.0	120.7	145.4
Culls bushels/acre	37.5	28.3	34.6
Total yield bushels/acre	130.5	149.0	180.0
Per cent culls	28.7	19.0	19.2

The mechanical digger gave a 20.5% increase of marketable potatoes over the yield obtained by digging with an ordinary turning plow.

The mechanical digger is particularly desirable in the control of weevils as it exposes the entire potato plant. This exposure is one of the controlling practices.

A concurrent-flow direct-fired rotary dehydrator for drying sweet potatoes was constructed and approximately ten tons of potatoes were dried. The capacity of the 5 x 28 foot drum drier was 860 dry pounds



Mechanical digger for sweet potatoes.

per hour (about 1720 pounds of water evaporated per hour). For greater efficiency and increased capacity, additional length and a positive drive on the drum would be required.

The shredder did an excellent job of cutting the potatoes when the knives were driven at speeds above 1400 r.p.m. At slower speeds the potatoes were often crushed instead of being cut clean.

The artificial drying of sweet potatoes for livestock feed is mechanically and economically possible for large growers or processors in sweet potato producing areas. Approximately twelve small dehydrators are being constructed for operation in the 1945 season.

## **Alligator Weed, Its Control and Eradication . . .**

W. H. Carter

Alligator weed (*Alternanthera philoxeroides*) was first discovered in this country in Florida in 1895, and in Louisiana in 1897. This weed, called alligator grass by many, has gradually increased its area of infestation. It may now be found in certain localities of the Florida



Parishes, at least as far north as Alexandria, in parts of the rice area, and definitely in the sugar-cane area.

### **Need For Study Recognized**

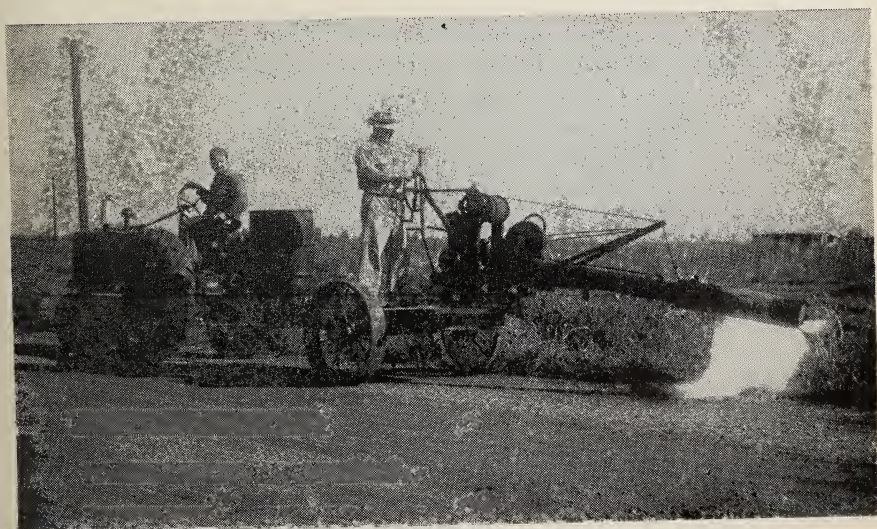
During the past three or four years the rate of spread of alligator weed infestation increased to such an extent that the 1944 State Legislature made a special appropriation for study of methods for its control and eradication. This work began September 1, 1944, and is being conducted in two departments, (1) Plant Pathology Research and (2) Agricultural Engineering Research.

### **The Engineering Approach**

The work in this department consists principally of developing cultural practices for the control and eventual eradication of the weed. It appears at this time that methods of approach similar to those used on the control and eradication of bindweed will be most effective. In addition, direct flaming and cover crops producing shade offer promising possibilities.

### **Nature of Weed**

Alligator weed grows as well on land as in the water. It will survive prolonged dry periods and will take root when covered with soil during a tillage operation, after having been exposed to the elements for from seven to ten days. It propagates itself from root and stem cuttings the size of which may be much smaller than those produced by any common tillage machine during a cultivation operation.

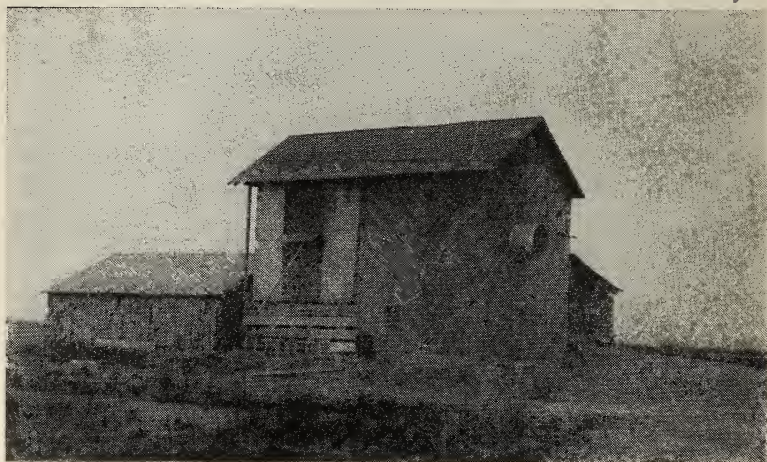


Weed burner in operation on ditch banks.

## Rice Harvesting, Drying, and Storage . . .

Harold A. Kramer

The combining, artificial drying, and bulk handling method of harvesting rice is becoming increasingly popular in Louisiana, and is being adopted as rapidly as machines and building materials become available. The conversion from sack storage to bulk storage requires considerable new construction and has brought about a need for more data on factors affecting the design of bulk storage bins for rough rice. To obtain such data, a pressure gauge was constructed



View of experimental rice drying plant operated during 1944 harvest season.

and pressures were measured in full size wooden bins already in existence. Provision was made during the recent construction of a new installation of concrete bins at Crowley, Louisiana, for installing a number of pressure gauges in the side walls and hopper bottoms of several bins of different sizes. Results of these tests will give considerable additional information on the pressures that may be expected in large concrete bins.

A study of the records of the State AAA office shows there are over 7,000 individual rice farms in Louisiana, and that about 70 per cent of these farms are 50 acres or less in size. Since there are no rice driers available on the market at a cost within range of the majority of the rice farmers of the state, a small low cost experimental drier of one combine capacity was constructed and operated this entire past season on the farm of John B. and Floyd Baker, near Gueydan, Louisiana. In connection with the drier, four round corrugated steel oil tanks were converted to working bins. Each



tank was supported on end by a heavy timber framework and a wooden hopper constructed inside. Each bin had a capacity of about 300 barrels when filled. The steel bins operated very satisfactorily in connection with the drier and no condensation was experienced. One lot of about 100 barrels of artificially dried seed rice was stored continuously for a period of eight weeks in one of the bins and was in excellent condition when removed.



Cart used in muddy fields to haul rice from combine to truck.

## **The Effect of Organic Matter, Deep Plowing, and Vegetable Cover on the Runoff, Erosion, and Crop Yields of the Lower Mississippi Loessial Soils . . .**

Harold T. Barr, James B. Holley, and C. T. Dowell

This is a cooperative project between the Agricultural Engineering Department of Louisiana State University and the Division of Water Control and Drainage, Soil Conservation Service, U. S. Department of Agriculture.

Chopping the stalks of cotton or corn and reversing the rows in the fall is common practice on many farms. Using this as a basis for comparison when corn is grown on a contour, the following results were found.

Reversing the rows and subsoiling decreased the runoff 22.8% and increased yield 50.9%; while the use of a winter cover crop reduced runoff 27.2% and increased yield 97.8%; and subsoiling plus a winter cover crop reduced runoff 49% and increased yield 166.8%.

THE INFLUENCE OF CERTAIN CROPPING PRACTICES ON EROSION AND CROP YIELDS (1944)  
Plots on 4% slope, cultivated on contour

	Corn alone Subsoiled 10/22/40	Corn alone Plowed only	Corn and soybeans Subsoiled 10/22/40 Winter cover crops '40, '41, '42, '43	Corn and soybeans Plowed Winter cover crops '40, '41, '42, '43
Run off in inches/A	12.62	16.34	8.33	11.86
Soil loss lbs/A	5988.87	6465.35	1788.75	4813.70
Ear corn in bushels/A	18.13	12.02	32.07	22.58
Plots on flat land, same soil type				
Ear corn in bushels/A	25.18	32.56	37.82	42.16

## Drainage of Sugarcane Land . . . Irwin L. Saveson

The developing and adapting of methods and machinery for installations and maintenance of drainage works on sugarcane lands is the purpose of this project. Reduction of installation and maintenance cost is also an allied purpose. To date, the work has been of an exploratory nature and no definite results are forthcoming.

For surface drainage, some land grading has been done and shows considerable promise. Lateral ditches have been constructed with tractor and grader. A dragline attachment for track type



Lateral ditch with grader and trac-type tractor.





Light weight drag line attachment for tractor being used for cleaning drainage canals and ditches.



tractor has been tried for constructing lateral ditches. It is planned to develop a cane tractor attachment for excavating lateral ditches.

For under drainage, mole drains have been installed and show they are effective. Further work is required as to the stability of the mole channel. For outlet channels, a side arm attachment for the large dragline from England is on hand. It is hoped with this attachment to clean the bottom of the channel without disturbing the banks, thus lessening the amount of excavation.

For maintenance, plans are under way for developing a mower to mow the small lateral ditches.

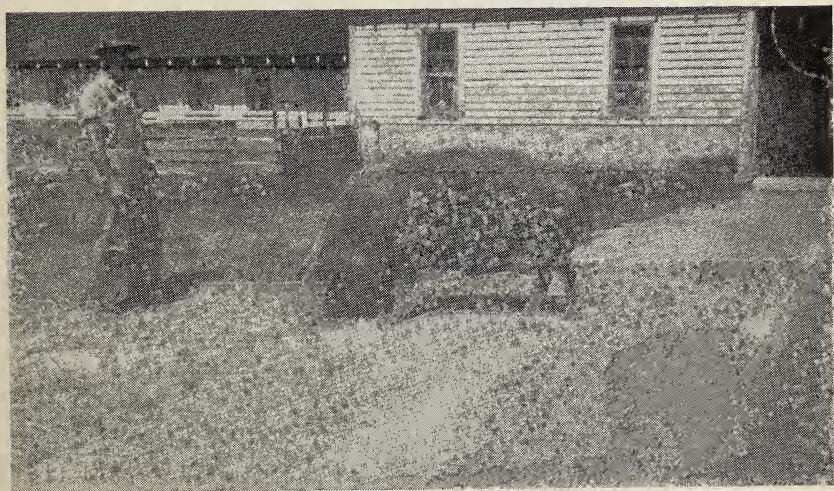
# *Animal Industry*



## **Breeding and Selection of Swine for Increased Production . . . Chas. I. Bray**

Work is being continued on this project on a somewhat reduced scale due to shortage of labor and high feed prices. Some excellent litters have been produced. Two lines of breeding appear to be quite promising, both of them tracing through Wave Queen 7th, 236890, PR 105, to Square Deal 110, 8010, one of the best foundation sows in the original herd.

Bang's disease, which caused considerable trouble in the herd in 1943-44, has been brought under control by blood testing and rotation of pastures. Testing and slaughtering alone will not get rid of



Production Registry sow. Farmers Best 191176 P. R. 143. Average number of pigs farrow — 6 litters 12.6. Average number raised — 10.3.

Bang's disease, if the clean animals continue to run on land recently pastured by infected animals. If reacting animals are sold or completely separated from the non-reactors and the non-reactors moved to uninfected pastures, the establishment of a clean herd is not difficult.

# Effects of Management and Seeding on Beef Cattle Pastures . . . Chas. I. Bray and S. E. McCraine

In the fall of 1942, the six experimental pastures which were seeded in 1938 had become sod-bound and were producing only half as much as in 1939, 1940 and 1941. In order to try out various methods of renovation, the pastures were disced or plowed and reseeded according to the following plan:

- Pasture 1—Disced but not seeded
- Pasture 2—Disced; seeded with red clover
- Pasture 3—Check; no treatment
- Pasture 4—Disced; seeded with red clover and Dallis grass
- Pasture 5—Disced; seeded with Alsike clover and Dallis grass
- Pasture 6—Plowed; seeded with Alsike clover and Dallis grass

In 1944 the red clover had died out in 2 and 4. Consequently grazing was discontinued in these two fields from April 5 to June 16, first in order to put more cattle on the remaining pastures, and second to obtain data on the effect of harvesting white clover seed on total grazing. Due to weather conditions it was not possible to obtain any clover seed after the clover was cut. The reduction in gains from cutting these pastures for seed amounted to about 80 pounds of gain per acre. The cattle that were put back on these two fields made good gains.

GAINS PER ACRE AND PER DAY — TOTAL GRAZING DAYS PER ACRE

	Gain per 1943	Acre 1944	Gains per day 1944	Days Grazing per A. 1944
Lot 1. Disced only.	212	274	.924	296
Lot 2. Disced, seeded.	218	199.5*	1.09	183
Lot 3. Unrenovated.	164	153	.74	206
Lot 4. Disced, seeded.	227	175*	.94	185
Lot 5. Disced, seeded to Alsike-Dallis.	194	220	.78	282
Lot 6. Plowed, seeded to Alsike-Dallis.	196	315.6	.96	329

\*Cattle taken off April 5 to June 16 in order to cut clover for seed.

Lot 3, which has been unrenovated since 1938, produced only half as much gain. Lot 6, which had been plowed and reseeded, made the best gains. Lot 1, disced without seeding, produced excellent gains; Lot 5 did not produce a good stand of grass for no explainable reason.



## Pasture Improvement and Winter Grazing in the Rice Area . . . Chas. I. Bray, J. L. Fletcher, and Lealon Cox

In 1943 two twenty-acre fields of old native grass pasture land were broken and seeded with Dallis grass, White Dutch clover and lespedeza and fertilized with 400 pounds per acre of 3-12-12 fertilizer. In the summer of 1944 both pastures were limed at the rate of one ton per acre. One of these pastures, 1-A, was seeded to winter oats in the fall of 1943. Twenty head of grade Angus heifers were put on the oats February 26 and remained until March 8 when the cattle were divided into two groups, one-half being turned onto native grass pasture and one-half remaining on the oat pasture. The twenty acres of winter oats produced a total gain of 1125 pounds or 59 pounds gain per acre.

Grazing continued until November 14th, Lot 1 on fertilized pasture and Lot 2 on unfertilized pasture. At the end of the season the heifers on fertilized pasture averaged 736 pounds with a gain of



Representative grade Aberdeen Angus heifers grazed on fertilized seeded pasture compared to one on native pasture, 1944 average weight 736 lbs. and 607 lbs., Lake Charles.

330 pounds per head. The nine remaining in Lot 2 weighed 607 pounds, a gain of 193 pounds for the summer. There was a marked difference in the appearance of the two groups of cattle as shown by the photograph of representative individuals in November.

## **Soybean Meal and Peanut Meal as Supplements to Mixed Grain Sorghums for Fattening Pigs . . .**

Chas. I. Bray and J. L. Fletcher

Tests were continued on the relative value of peanut meal and soybean meal fed alone or in combination with tankage. The basic feed was a mixture of ground kafir and milo, supplemented as follows: Lot 1, soybean meal, alfalfa meal, and tankage; Lot 2, soybean meal, alfalfa meal; Lot 3, peanut meal and alfalfa meal; Lot 5, peanut meal, alfalfa meal, and tankage. The results obtained appear unfavorable to peanut meal. A winter oat pasture was not available as in previous years and alfalfa meal was added to replace pasture as a source of Vitamin A. For some reason the peanut meal lots did not do as well during the first part of the experiment as in 1943 and this may have been due to some cause other than the meal. This experiment is being repeated in 1945 with yellow corn as the basal ration.

Lot No.	Protein Supplement	Gain Per Day	Feed Per 100 Lbs. Gain
1	Soybean, Alfalfa Meal, Tankage	1.81	345.8
2	Soybean Meal, Alfalfa Meal	1.82	335.5
3	Peanut Meal, Alfalfa Meal	1.43	412.9
5	Peanut Meal, Alfalfa Meal, Tankage	1.63	390.5

As in 1943 there was not a great deal of difference between the lots fed soybean meal alone and soybean meal with tankage, indicating that soybean meal is a very satisfactory protein supplement when used without an animal protein. There was a marked difference, however, when tankage was added to peanut meal.

## **Fertilized Pastures on Old Rice Land in Louisiana . . .**

Chas. I. Bray, J. L. Fletcher, and Lealon Cox

The work was continued as in 1943. Fertilizer was reapplied in Lots 2 to 6 as in 1942. Forty-six head of yearling cattle were supplied by Swift and Company. Grazing was somewhat short during mid-summer due to dry weather, but during the latter part of the year there was good rainfall and the cattle had more grass than they could use. The grazing season ran from June 13 until October 31. The gains per day were satisfactory. With a longer grazing period and with more cattle on Lots 2 to 6, the gains per acre would have been much higher. Lot 1 was completely grazed by the end of the season.



	No. of Cattle	Total Gain Per Acre 1944	Gain per Head	Gain per Day
Lot 1. Unfertilized	6	67.5	112	.80
Lot 2. Lime, Ca. Metaphosphate	8	138.5	173	1.23
Lot 3. Superphosphate	8	115.5	145	1.03
Lot 4. Complete fertilizer	8	94.5	118	.84
Lot 5. Ca. Metaphosphate	8	123.5	155	1.11
Lot 6. Ca. Metaphosphate Muriate of Potash	8	101.5	127	.91

The results were in general quite similar to those obtained in 1943. The limed pasture, Lot 2, produced the best gains. In Lot 1, unfertilized, the lespedeza and clover has almost entirely died out leaving only native grasses. The production on this lot was approximately half of that on Lot 2. Calcium-metaphosphate alone (Lot 5) gave the next best results, but there was very little difference between the lots fertilized without lime. Lot 4, complete fertilizer, showed a low gain but this was evidently due to some difference in the cattle rather than to a lack of forage as there was plenty of grass in the pasture.

## Raising and Marketing Calves and Yearlings by Various Methods . . . S. E. McCraine, Chas. I. Bray and J. B. Francioni

Work is being continued as in 1943 on creep feeding and winter feeding grade beef calves. Weights are taken and valuations made on calves at weaning time, also at the close of winter feeding and at the end of the fall grazing season for yearlings. Creep fed calves averaged 416 pounds at weaning in 1945 and were valued at \$13.07 per 100 pounds or \$54.37 per head. Calves raised on pasture alone, averaged 401 pounds at weaning time and were valued at \$12.48 per 100 pounds or \$50.04 per head, making a difference of \$4.33 per head in favor of the creep feeding, or barely enough to cover the cost of feed.

### FINAL WEIGHTS AND SALE VALUES 1943-44

	Average Weight	Average Valuation per 100 $\pm$	Value Per Head
Grass fed calves, 1944	401	\$12.48	\$50.04
Creep fed calves, 1944	416	13.07	54.37
Grass fed calves fattened in dry lot, 1943	575.5	14.57	83.90
Creep fed calves finished in dry lot, 1943	578.5	14.78	85.51
Yearling (Heifers) finished on grass, 1943	685	12.10	82.88

One lot of creepfed calves was fed in comparison with one group taken off grass alone. The creep fed calves took to feed more readily and at the end of the first month had gained 42 pounds per head more than those not creep fed and appeared almost ready for market.

The results this year are not any more favorable to creep feeding than in 1943, and indicate that on good clover pasture there is not a great deal of advantage in creep feeding. However, the calves that have been accustomed to eating grain on pasture appear this year to take better to feed when put on dry lot rations.

## Hill Land Pasture Investigations . . .

Chas. I. Bray and J. L. Fletcher\*

The hill-land pasture experimental work was retarded considerably by drouth during mid-summer but during the latter part of the year there was sufficient rainfall and gains were better than in 1943.

### Ringgold

Fertilizer was applied on Fields 1 and 3 as in previous years, with basic slag on Field 4. Field 1, which had a second application of 1000 pounds of lime per acre in 1944, produced the best gains and has a better stand of White clover than any of the other pastures. Field 2, receiving no fertilizer, is becoming much less productive. Mixed fertilizer, 0-14-7, appeared to better advantage than basic slag. Ringgold pastures were very short in July due to dry weather, but improved in August when there was sufficient rainfall.

	Acres	No. of Cattle	Gain Per A	Gain Per Head	Pasture Days per A
Lot 1. Lime & fertilizer	7	9	303	235	228
Lot 2. No fertilizer	7	7	143	143	177
Lot 3. Fertilizer only	7	10	283	198.6	253
Lot 4. Basic slag	9½	12	237	181	229

### Dry Prong

In the Dry Prong experiments, grade cows, calves, and yearling heifers were grazed on fertilized pastures in comparison with similar cattle grazed on a tract of 1200 acres of fenced woodland pasture similar to much of the open rangeland found in Northern Louisiana.

\*In cooperation with E. C. Parker, Ringgold; D. V. Donaldson, Dry Prong; Murphy Gunter, Forest Hill and Richard Fuller, Calhoun.

No fertilizer was applied on the pastures in 1943. Field 3, lime and fertilizer, showed a good stand of clover and was grazed heavily during the driest portion of the season. This field produced 140.4 pounds gain per acre from a total of 157.3 grazing days per acre, including calves. Field 1, fertilized without lime, but limed in mid-summer produced 177.5 pounds gain per acre. The conditions, however, were not similar as this field was not grazed during the dry season and was allowed to grow up well in grass and lespedeza before cattle were turned in the field in the fall. Yearling cattle on



Creep fed calves from high grade Hereford herd. Baton Rouge. Wt. 416 lbs.

fertilized pasture gained 185 pounds in 137 days as compared to 114 pounds gained on unfertilized woodland. Calves on fertilized pasture weighed 247.5 pounds on Sept. 13 on fertilized land compared to 197 pounds weighed on unfertilized land. Gains on mixed herds containing cows and calves are probably not comparable with gains made with yearlings and other cattle. One definite case of "creeps" was found in the herd running on unfertilized woodland. This was a cow with a young calf. The cow was so lame that she could hardly be driven out of the pasture, but after being brought to the barn and fed cottonseed meal she recovered rapidly. The cows and calves on fertilized pasture have a much better appearance than those on unfertilized land. All cows were brought off the woodland September 13, and finished the season on unfertilized pastures.

### Forest Hill

The Forest Hill test consists of only one twenty-acre field of limed and fertilized pasture on unbroken native sod, seeded with clover, Dallis and lespedeza. While this pasture was considerably





Grade calves on hill land fertilized pasture averaging over 400 lbs. wt. in fall. Dry Prong.

over-grazed and had eight weeks without rain in mid-summer, it produced 142 pounds gain per acre with a total of 182.6 grazing days, comparing closely with the gains produced at Dry Prong.

### Calhoun

This is a comparison of 15 acres of limed, fertilized and seeded pasture compared to 10 acres of unlimed and unfertilized seeded pasture on extremely poor hill-land. Gains were 119.3 pounds per acre on the fertilized land and 52.5 pounds per acre on unfertilized land.



Clever pasture on limed and fertilized hill land — formerly in cotton.

This pasture has not yet become established, but Bermuda grass is spreading rapidly on the fertilized field.

## **Special Pasture Investigations . . . D. L. Bornman, Jr.**

Outfield pasture experiments have been established in five parishes in different sections of the state since the Fall of 1943. The tests have the following objectives: (1) to determine methods of establishing profitable pastures, (2) to compare value of various grasses and legumes in pasture mixtures, (3) to study methods of renovating permanent pastures, (4) to study the effects of liming and fertilization on: (a) total production of beef, (b) length of productive grazing period, and (c) composition of pasture herbage.

The progress of the pastures to date has been very satisfactory. No statistical data will be reported before the end of the present grazing year.

The test-demonstrations are located on the property of beef cattle producers. The names of the cooperators, their locations and the scope of the experiments are as follows:

MR. N. L. MOORE — Winnsboro, Louisiana — Franklin Parish—  
Six ten-acre pastures are in this test.

MR. D. C. JOHNSTON — Jackson, Louisiana — East Feliciana  
Parish — Six eight-acre pastures have been established.

MR. R. R. MADDEN — East Point, Louisiana — Red River  
Parish — Three eight-acre plots.

MR. H. MITCHINER — Oak Grove, Louisiana — West Carroll  
Parish — Four twenty-acres pastures are in this test.

MR. H. LYLES — Longville, Louisiana — Beauregard Parish —  
Eight ten-acre pastures have been planted in this experiment.



# *Crops and Soils*



## **Fertilizer Recommendations of the Louisiana Agricultural Experiment Station for Field and Pasture Crops . . . M. B. Sturgis**

**COTTON.** On river bottom soils use 30 to 42 pounds of nitrogen per acre applied before planting or as a side-dressing. Where available phosphorus is low, use 350 to 400 pounds per acre before planting of a 10-6-4 or 12-8-0. On alluvial soils where rust is prevalent, especially in the Ouachita, Bartholomew and Bouef River bottoms, use 300 to 400 pounds of 12-0-12, 10-0-10, or 9-6-9; or 600 pounds of 6-8-8 per acre before planting.

On soils of Coastal Plain, Coastal Prairies and Mississippi Terraces (Loessial Hills) where rust is not prevalent, use 400 to 600 pounds per acre of an 8-8-8, 6-9-6, or 5-10-5 applied at or before planting.

On Coastal Plain soils in the hilly areas, having heavy reddish sub-soils, use 400 to 600 pounds of 6-8-4.

On soils of Coastal Plain, Coastal Prairies, and Mississippi Terraces (Loessial Hills) where rust is prevalent, use 400 to 600 pounds of an 8-8-8, 6-8-8 or 4-8-8 per acre. If the initial application supplies less than 30 pounds of nitrogen, bring the total nitrogen application up to 30 to 36 pounds per acre by side-dressing.

**CORN.** On heavier and more fertile river bottom soils, side-dress with 45 pounds of nitrogen per acre. For corn on lighter river bottom soils, such as very fine sandy loams, use 300 pounds per acre of 4-8-8, 6-8-8, or 8-8-8 applied under before planting and side-dress with 30 pounds of nitrogen.

On the soils of the Coastal Plain, Coastal Prairies and Mississippi Terraces, use 300 pounds per acre of a 4-8-8, 6-8-8 or 8-8-8 and side-dress with 30 pounds of nitrogen.

**RICE.** On the lighter colored silt loams and very fine sandy loams low in organic matter, use 300 pounds per acre drilled in with or below the seed of 6-9-6, 6-8-8, 5-10-5, or 4-12-8. On the darker colored silty clay loams, clay loams and soils just recently put in rice, use 200 to 300 pounds per acre of 4-12-8 or 5-10-5. On muck soils use 200 pounds per acre of 0-14-7 or phosphates only.

**SUGARCANE.** For stubble cane in all areas, except where known deficiencies of phosphorus and potassium exist, use 36 to 42

pounds of nitrogen per acre. For plant and stubble cane in all areas of low productivity: (1) where only nitrogen is deficient, apply 36 to 42 pounds of nitrogen per acre; (2) where nitrogen and phosphorus are deficient, apply 300 to 400 pounds of a 12-8-0 or 10-6-4 per acre; (3) where nitrogen, phosphorus, and potassium are deficient, apply 300 to 450 pounds of 12-8-12 or 9-6-9 per acre; and (4) where nitrogen and potassium are deficient, apply 300 to 400 pounds of 12-0-12 or 10-0-10 per acre.

**OATS.** On river bottom soils use 45 pounds of nitrogen per acre as a top-dressing. On the soils of the Coastal Plain, Coastal Prairies, Mississippi Terraces and the lighter, very fine sandy loams of the river bottoms, use 300 pounds per acre of a 4-8-8, 6-8-8, or 8-8-8 applied under before planting and top-dress with 30 pounds of nitrogen.

**PEANUTS.** Use 300 to 400 pounds per acre of a 4-12-8 or 3-12-12.

**SOYBEANS.** On Coastal Plain, Mississippi Terraces and Coastal Prairie soils, use the same fertilizers as recommended for peanuts. On heavier soils, use 300 to 400 pounds of 0-14-7 or 0-12-12 per acre. Soybeans on river bottom soils usually do not require fertilization.

**LESPEDEZA.** On lighter colored soils which are low in organic matter, use 300 to 400 pounds per acre of a 3-12-12. On the heavier soils, use 300 to 400 pounds per acre of 0-14-7 or 0-12-12.

**PASTURES.** For fall or winter planted mixed and clover pastures on all soils, except heavier soils of the river bottoms, use 400 pounds of 3-12-12 or 4-12-8 per acre. For spring applications, use 400 pounds per acre of 0-12-12 or 0-14-7. For the lighter bottom soils, such as very fine sandy loams, use 50 pounds of  $P_2O_5$  in any of the common phosphates.

**GRASS PASTURES, SUDAN, ETC.** On the soils of the river bottoms, apply 30 to 45 pounds of nitrogen per acre in one or more top-dressings. On the upland soils, apply before or at planting, 300 pounds per acre of 4-8-8, 5-10-5 or 6-8-8 and side- or top-dress with 20 to 30 pounds of nitrogen.

**POTATOES AND GENERAL TRUCK CROPS.** The Horticulture Department recommends the 4-12-4, 4-12-8 and 6-8-8 grades for Irish and sweet potatoes. The 4-12-4, 5-10-5 and 6-8-8 grades are recommended for general truck. The 4-12-8 and 6-8-8 grades are recommended particularly for the hill areas of the Coastal Plain. Specific recommendations for the amounts and times of application can be secured from the Horticulture Department.

The annual plant food requirements which should be met through the application of fertilizers to Louisiana soils are approximately:

33,000 tons of nitrogen, 50,000 tons of  $P_2O_5$  and 40,000 tons of  $K_2O$ . In terms of the more common carriers, Louisiana should apply annually 495,000 tons of fertilizers for efficient crop production. In addition to this 300,000 tons of ground limestone and shell are needed annually to replace the losses and crop removals of calcium and magnesium.

## **Loss of Nitrogen from Flooded Soil as Affected by Changes in Temperature and Reaction . . .**

William H. Willis and M. B. Sturgis

It has been repeatedly observed that rice growing in soils low in nitrogen content fails to respond proportionately to the nitrogen added in fertilizers. The relatively low response of the crop to the added nitrogen has been explained as largely due to two causes: first, an increase in the growth of weeds which may use the nitrogen before the young rice is big enough to compete for it; and, second, the loss of the nitrogen from the soil which may occur either by diffusion of soluble nitrogen into the irrigation water from which the rice plant cannot absorb it very effectively or by loss of the nitrogen completely through volatilization. It has been the purpose of this study to determine conditions and mechanisms of the loss of nitrogen from soil subjected to treatments similar to those found in rice fields. Obviously, the amount and forms of nitrogen, the moisture content, the temperature and the hydrogen-ion concentration of the soil and water are of primary importance.

At 100°F. large quantities of nitrogen as ammonia were lost from a soil of high nitrogen content. Both flooding and decrease in H-ion concentration increased the loss of nitrogen. Comparatively small losses of nitrogen as ammonia were observed as the result of flooding in soils low in nitrogen at temperatures of 80-85°F. High losses of ammonia may occur in an acid soil high in organic matter where ammonia is being liberated by decomposition; but in a soil low in organic matter and with a high exchange capacity, a considerable amount of ammonium nitrogen may be held at relatively high temperatures and at reactions near or even slightly above neutrality. Nitrogen was lost from all the soils under flooded conditions with the larger losses occurring from soil high in nitrogen or where large additions of nitrogen have been made. Apparently a soil will reach an equilibrium at which it will tend to maintain a low soluble nitrogen content against losses induced by high temperatures and alkaline reactions. Ammonium nitrogen diffused out of the soil into the flood water and the pH of the flood water increased with time. Within

four to seven weeks the change toward alkalinity of the flood water together with high temperatures, 85-107°F., reduced the content of ammonium nitrogen in the flood water. In an acid soil low in nitrogen which was flooded, had different treatments, and was held at temperatures varying from 85-107°F., the soil-water system lost quantities of nitrogen, varying from 11 to 53 p.p.m. The greatest loss occurred where organic nitrogen and lime were added. Ammonium nitrogen added to buffered flood water disappeared quickly at reactions above pH 6.7 at temperatures of 85-107°F. Determinations of total nitrogen losses from the soil-water system indicate that the ammonium nitrogen disappearing from the flood water was not adsorbed by the soil.

The results of this study indicate that the nitrogen fertilization of rice may be greatly improved by placing the fertilizer directly below the seed at a depth of 2½ to 3½ inches. The deeper application will allow the soil to prevent the loss of the nitrogen into the flood water.

## **Soil Analysis and Fertilizer and Lime Requirements . . .**

W. J. Peevy, C. W. McMichael and R. H. Brupbacher

The Soils Laboratory of the Agronomy Department received about 2,200 soil samples during the past year, all of which have been analyzed and the results sent to the farmers and agencies who helped secure the samples.

Considerable progress is being made toward supplying the needs of some of the elements found to be deficient in many areas of the State, but little progress has been made toward supplying the needs of others. It is estimated that 250,000 tons of superphosphate, 80,000 tons of muriate of potash, and 500,000 tons of ground limestone should be added annually to the soils of Louisiana. During the past year about 260,000 tons of liming materials were used, but the equivalent of only about 90,000 tons of superphosphate and 22,000 tons of muriate of potash was used, which is only a small percentage of the phosphorus and potassium needed. Unless these materials are used as needed, too little benefit will be derived from the use of the lime in most instances. Lime and fertilizer recommendations have been made by the Soils Laboratory for more than 2,000 improved pastures, and it has been seldom found that lime was needed where phosphorus or potassium, or both of these elements, were not needed. In addition to the use of these materials, it is essential to prepare a good seedbed, apply the lime and fertilizers in different operations to depths of 1 to 3 inches, and seed the pasture with a good mixture if maximum returns are to be expected.



With non-leguminous field crops, the benefits derived from the use of lime are mostly indirect. When properly used with fertilizer in a crop rotation program on acid soils, the lime will give larger growths of leguminous crops, which when plowed under will produce better growth of crops such as cotton or corn. When lime is used on a poor, acid soil which is not fertilized and where no legumes are grown, no noticeable benefits are likely to be obtained.

## **Tolerance of Rice to Salt Water . . . W. J. Peevy**

During the past few seasons the old problem of salt water damage to rice has caused considerable discussion in the western part of the rice area, partly due to the belief by some farmers that the industries in the area were polluting the streams. An experiment was set up to determine the toxicity of salt water from one of these industries, the Mathieson Alkali Works, as compared to the toxicity of Gulf water and also to obtain further information on the tolerance of rice to salt water.

Work was done by F. C. Quereau in 1918 at the Rice Experiment Station and reported in Louisiana Agricultural Experiment Station Bulletin No. 171. He recommended that growers should not use water containing more than 35 grains of salt per gallon in a flooding of from 4 to 8 inches if this amount of salt water is to remain on the field until it evaporates or is diluted with fresh water. He also advised not to flood a second time with water containing more than 15 grains of salt per gallon. These concentrations and amounts of salt water would give, in terms of salt content of the surface soil, 0.05 to 0.06 per cent.

The following table gives the Canal Companies' tolerances of rice to salt water, which is commonly followed by many growers.

Stage of growth	Days after emergence	Tolerance in grains per gallon	
		Blue Rose	Early Prolific
Tillering	20- 40	75-100	75-100
Jointing	40- 70	75-100	140-175
Booting	70- 90	200-250	175-200
Heading	90-100	250-275	200-225

In the work done by the Station this year, two kinds of salt water were used, namely, Gulf water and waste water from the Mathieson Alkali Works at Lake Charles. The Gulf water was obtained from the Coast Guard through the county agent's office. The sample was taken seven miles out from the mouth of the Calcasieu River. This water contained 2.68 per cent soluble salts, largely sodium chloride, or 1576 grains of salt per gallon. The sample of the Mathieson waste



# EFFECTS OF APPLICATIONS OF GULF WATER ON THE GROWTH OF BLUE ROSE RICE IN DIFFERENT STAGES OF GROWTH

Concentration of salts in water, grains per gal.*	Tillering or 32 days after emergence	Jointing or 60 days after emergence	Booting to heading or 84 days after emergence
37	No leaf damage, normal yield of grain	No leaf damage, most of heads empty, 25% yield of grain	No leaf damage, normal heads, normal yield
74	No leaf damage, normal yield of grain	No leaf or stem damage, some bad heads, 70% yield of grain	Half of plants stunted and did not develop heads, 45% yield of grain
148	Leaves browned and curled within 3 days, severely damaged to harvest, many empty heads, 30% yield of grain	Leaves immediately damaged, 40% of heads empty, 35% yield of grain of poor quality	Most of heads damaged, 45% of heads empty, 40% yield of grain
296	Leaves burned, no plants lived to maturity, most plants died within 42 days	Leaves curled and browned within 3 days, most of the plants killed within 21 days, no plants matured	Most of leaves burned severely, some plants were partly green at maturity, few heads filled, 20% yield of grain
592	Most plants killed within 21 days, no plants matured	Most plants killed within 21 days, no plants matured	Most plants killed within 21 days, few heads formed but were empty or faulty, 5% yield of grain of poor quality

\*These values represent the concentration of salts in the water after the water which was added had been diluted with the fresh water already in the soil. Assuming that the quantity of salt water added was about equal to the fresh water already present on the rice, these values are equivalent to irrigation water containing about twice these amounts of salts. In terms of concentration of salts on the basis of soil, 37 grains of salts per gallon correspond to 0.05 per cent salt in soil, 74 to 0.10, 148 to 0.20, 296 to 0.40, and 592 to 0.80.

water was taken at the outlet gate in pit No. 1 where the water flows into the Calcasieu River. This water contained 6.03 per cent soluble salts, most of which was calcium chloride, or 3547 grains of salt per gallon.

Five concentrations of the two kinds of salt water were applied to rice at three different stages of growth. The concentrations used were 37, 74, 148, 296, and 592 grains per gallon. The stages of growth when salt water was added were 32, 60, and 84 days after emergence. The salt waters were added after the rice had been watered with fresh water. Frequent observations were made after the applications until the rice was harvested. The effects of the different concentrations of salt waters on plant growth and yields are given in the accompanying tables.

### SUMMARY

1. When the soil is saturated with fresh water at the time of application of salt water, the tolerances of rice to salt water generally accepted by the Canal Companies are fairly reliable. However, if the soil is beginning to dry out and crack, the tolerances will be much less in terms of grains of salt per gallon of water.
2. Damage from Mathieson waste water was apparently a little more severe than damage from Gulf water.
3. No damage was caused by a concentration of 37 grains per gallon when added at the tillering or heading stages, but damage was caused when added at the jointing stage.
4. No damage was caused by a concentration of 74 grains per gallon when added at the tillering stage. Damage was caused at later stages by addition of this amount of salt.
5. Salt concentration of 148 grains per gallon damaged rice severely, regardless of age of rice when added.
6. Salt concentration of 296 grains per gallon killed all plants when added at the tillering or jointing stages and very severely damaged the plants when added at the booting stage.
7. Salt concentration of 592 grains per gallon killed all plants at all stages of growth.

# EFFECTS OF APPLICATIONS OF MATHIESON WASTE WATER ON THE GROWTH OF BLUE ROSE RICE IN DIFFERENT STAGES OF GROWTH

Concentration of salts in water, grains per gal.*	Tillering or 32 days after emergence	Jointing or 60 days after emergence	Booting to heading or 84 days after emergence
37	No leaf damage, normal yield of grain	No leaf damage, most heads empty, 30% yield of grain	No leaf damage, few heads filled, several empty heads, 25% yield of grain
74	Some leaf damage, normal yield of grain	Some leaves burned, 35% yield of grain	Half of plants stunted and did not develop heads, 40% yield of grain
148	Leaves burned on lower half of plants, badly damaged harvest, 40% yield of grain	Many leaves burned, severely damaged harvest, 90% of heads empty, 5% yield of grain	Most of heads damaged, 40% of heads empty, 50% yield of grain
296	Leaves burned within 1 day, no plants lived to maturity	Leaves burned within 2 days, no plants lived to maturity	Most leaves burned severely, some plants partly green at maturity, 20% yield of grain
592	Most plants killed within 21 days, no plants matured	Most plants killed within 21 days, no plants matured	Most plants killed within 21 days few heads formed but none filled

\*These values represent the concentration of salts in the water after the water which was added had been diluted with the fresh water already in the soil. Assuming that the quantity of salt water added was about equal to the fresh water already present on the rice, these values are equivalent to irrigation water containing about twice these amounts of salts. In terms of concentration of salts on the basis of soil, 37 grains of salts per gallon correspond to 0.05 per cent salt in the soil, 74 to 0.10, 148 to 0.20, 296 to 0.40, and 592 to 0.80.

## Cotton Varieties . . . H. B. Brown

When the cotton growing industry is at an apparent division of the ways as at present, the cotton breeder hardly knows which way to turn or what goal to work toward. There is a large surplus of cotton on hand, and serious competition is being offered by synthetic fibers and by cotton from foreign countries. The cost of cotton production has been reduced considerably by the introduction of better varieties, the use of better cultural methods, and the planting of better lands, but it is going to be necessary to reduce the cost of production still more if cotton is to be a profitable crop for all farmers. Some further reduction doubtless can be made on larger farms where tractors and four-row cultivators can be used. Hoeing can be largely eliminated by plowing across the rows in such a way as to block out the hills of young cotton plants much as the cotton chopper does with a hoe. The greatest economy of labor, however, will be in the use of mechanical cotton harvesters, some of which are reputed to pick a bale of cotton at an operating expense of less than five dollars.

Variety tests conducted in various sections of the State for a number of years indicate that, for the main alluvial lands, Delfos is the most profitable variety to grow. The leading strains of this variety are Delfos 531, Delfos 444, and Delfos 9169, the latter being a comparatively new strain that has been tested in the State for only two years, but has given uniformly good results here and in other states. This strain is an excellent producer, has a larger boll and higher lint percentage than most strains of Delfos and has good staple length and uniformity. Delfos 444 has very prolific, dwarfish-type plants which will make them suitable for picking with a mechanical harvester.

On alluvial lands that are infested with the *Fusarium* wilt disease, if the grower wants a long staple variety, Delfos 425 is probably the best variety to be had.

Experiments at the Calhoun Experiment Station, running over a period of years, have indicated that a big boll variety like Miller is the best for the poor hill lands of north Louisiana. It is a relatively good producer, has a large boll which makes it a good picking cotton, has fewer defective or runty bolls than most other varieties, and a fiber with satisfactory spinning qualities for a short cotton. Miller 919 is the strain being distributed by Experiment Stations at present. Other varieties that may be recommended for the hill land region are Deltapine 14, Stoneville, Coker 4 in 1, and Dixie Triumph, the last two being especially adapted to wilty soils.

On the bench land soils of Louisiana and on the prairie soils of the southwestern part of the State, Deltapine 14 and Stoneville



are leading varieties. Strains of Coker 100 and Stonewilt, which are selections from Stoneville, have been tested in our experiments and found to possess much merit. For soils in this area infested with the Fusarium wilt organism, Stonewilt and Dixie Triumph are recommended varieties. (For data on the varieties mentioned in this discussion and on numerous other varieties grown in tests, see Annual Preliminary Reports issued by the Crops and Soils Department.)

### Effect of Fertilizers on Cotton Blooming Rate, Percentage of Boll Set, Percentage of Five-lock Bolls, and Prevention of Diseased and Worthless Bolls

H. B. Brown

Treatment	Number blooms	Number bolls set	% boll set	% five-lock bolls	% diseased and worthless bolls
1. Check — no fertilizer	518	199	38.4	17.9	18.1
2. 1000 # 5-10-4 fertilizer	1534	888	57.9	41.0	7.0
3. 50 # nitrogen	334	123	36.8	12.9	32.5
4. 100 # phosphoric acid	1185	689	58.1	40.1	7.0
5. 40 # potash	425	177	41.6	11.5	22.6
6. 50 # nitrogen 100 # phosphoric acid	1307	720	55.1	34.6	11.8
7. 100 # phosphoric acid 40 # potash 20 tons manure	1657	985	59.5	42.3	3.2
8. 1000 # 5-10-4 fertilizer and extra water	1412	846	59.9	35.0	8.3

The above table gives data on the fruiting of 32 small plots of cotton grown during the season of 1944. The land used was uniform but naturally very poor, being especially low in phosphorus. With the exception of phosphoric acid, the application of single element fertilizers failed to give any increase in number of blooms, percentage of boll set, or percentage of 5-lock bolls. The complete fertilizers gave very consistent increases. Probably the small amount of nitrogen and potash in the soil originally was sufficient to unite with the phosphoric acid applied and make a fair fertilizer. In every case the plants receiving phosphoric acid were early, bloomed well, and had a good percentage of boll set and 5-lock bolls. The better fertilizers increased consistently the percentage of boll set and the number of five-lock bolls and also lowered the percentage of diseased and worthless bolls.

The data shown in the above table were obtained from the plots in which a study is being made of the effect of different fertilizers on cotton fiber quality. Results agree well with results obtained

## Effect of Date of Blooming on Set of Cotton Bolls

H. B. Brown

Date of blooming	Number blooms tagged	Number mature bolls produced	Percentage of flowers that made open bolls
July 17	280 on all plants	191	68.2
July 18	245 on all plants	196	80.0
July 27	12 on small plants	7	58.3
July 28	263 on all plants	54	20.5
July 29	307 on all plants	57	18.6
July 30	48 on small plants	22	45.8
Aug. 10	9 on all plants	1	11.1
Aug. 11	112 on all plants	3	2.7
Aug. 12	141 on all plants	21	14.9

from a similar study made in 1943 and show that there is a much higher percentage of boll set during the early part of the blooming period. For blooms that open after the first of August the boll set percentage is low. However, the percentage shown in the above table is somewhat higher than normal because on a part of the plots there were small plants which started blooming comparatively late. These

## Effect of Fertilizers on Boll Period

H. B. Brown

Treatment	Number bolls studied	No. days in boll period Weighted average
1. Check No fertilizer	38	51.9
2. 1000 # of a 5-10-4 fertilizer	72	45.0
3. 50 # nitrogen	26	51.6
4. 100 # phosphoric acid	84	44.8
5. 40 # potash	46	50.9
6. 50 # nitrogen 100 # phosphoric acid	124	43.9
7. 100 # phosphoric acid 40 # potash 20 tons manure	80	44.3

late-blooming plants had fewer bolls set on August 10, hence held a higher percentage of the new forms. The variation in set for dates separated only by a day or two may have been caused by weather changes, rain, etc.

By boll period is meant the number of days from bloom to boll opening. This represents the number of days needed for the boll contents to develop and mature. A glance at the above table shows that the complete or better fertilizers consistently shortened the boll period six to eight days.

## Effect of Summer Legumes in Corn at Baton Rouge

H. B. Brown

Treatment	Corn weight from plots				Total grain weight Pounds	Bushels per acre 1944	5-yr. av. bushels per acre
Corn after Austrian winter peas	30.7 28.5	15.7 14.5	24.2 24.2	15.7 16.4	169.9	30.3	38.4
Corn with coffee weed ( <i>Sesbania</i> ) at lay-by time	16.8 18.9	14.1 15.3	29.5 27.2	15.8 15.0	152.6	27.3	35.4
Corn with <i>Crotalaria</i> ( <i>Crotalaria spectabilis</i> ) at lay-by time	21.1 19.0	21.3 19.0	21.2 24.5	19.0 17.8	162.9	29.1	37.2
Corn with cowpeas at lay-by time	16.5 15.0	19.2 20.0	16.0 18.3	18.8 20.0	143.8	25.7	34.3
Corn with soybeans at planting time	16.5 18.0	16.8 17.5	12.0 10.5	15.0 14.5	120.8	21.6	34.4
Corn with velvet beans at planting time	14.5 15.9	14.4 14.0	18.0 18.2	25.5 23.5	144.0	25.7	36.2
Corn with 150 # nitrate of soda	20.3 19.0	25.2 24.7	19.5 18.0	18.5 18.0	163.2	29.1	40.9
Corn without treatment	12.0 11.6	18.3 15.6	9.1 11.8	11.8 13.2	103.4	18.5	31.4

The season of 1944 was unfavorable for corn production in that during the fore part of the season there was too much rain and during the latter part not enough. This unfavorable weather seemed to make the soil irregularities more striking in their effects. Also, during the dry period, the drought affected the corn worse where there were legumes planted when the corn was planted.

The nitrate of soda treatment resulted in largest yields, but they were not much larger than the yields after Austrian winter peas.

The cost of the nitrate of soda was somewhat higher than the cost of the pea seed, while the peas probably had more permanent effect on the soil.

## **Effect of Certain Hormones on Field Crops . . . H. B. Brown and C. F. Moreland**

Due to interest on the part of the public in regard to the effect of hormones on the growth and production of field crops, the Experiment Station began some test work on certain hormones in 1942 and the work was continued in 1943 and 1944. Naphthalene acetic acid, levulinic acid, "Rootone", "Grain-O", copper aconitate, and aconitic acid were tried on seeds of soybeans, corn, and cotton before planting, and on the flowers of corn and cotton when in bloom.

The effects were neutral in most cases, but in some instances the treatment of seed delayed or lowered the percentage of germination. No difference in the growth of plants due to the treatment could be detected during the growing season and the treatment of flowers appeared to have no effect.

In general the hormone treatments as used had no significant beneficial effect and it seems doubtful if they will be useful in increasing the production of field crops.

## **Outfield Experiments with Cotton, Corn, Soybeans and Oats . . . Fred A. Peevy**

Outfield fertilizer experiments with cotton show that a 6-8-4, 6-8-6, 6-8-8 and 6-12-6 are well adapted grades for the sandy loam coastal plain soils of Louisiana when applied at the rate of 400 to 600 pounds per acre. On the Mississippi terrace soils 400 to 600 pounds of a 6-8-6 or 6-8-8 have given the best results except in the potash-deficient area of St. Landry Parish where a 6-8-12 has been found to be a better ratio. The ratios that are adapted to the Mississippi terrace soils are also adapted to the Portland sandy loam and silt loam soils in the Ouachita bottom. An application of 400 to 600 pounds of 8-8-4 or an 8-8-6 has produced profitable returns on the Yahola very fine sandy loam soils along the Red River.

Corn fertilizer experiments on the Mississippi terrace soils and the sandy soils along the Red River show that 300 pounds of 5-8-8 applied under corn and side-dressing with 200 to 300 pounds of nitrate of soda are more profitable than side-dressing with 200 to 300 pounds of nitrate of soda alone. Similar results have been obtained from tests on the coastal plain soils.



Oat fertilizer experiments were started in October, 1943, at several locations in the State. Tests conducted on the Red River soils indicate that the application of 300 pounds of 5-8-8 under oats in the fall is profitable if the oats are to be top-dressed with more than 200 pounds of nitrate of soda per acre. A similar test conducted on a coastal plain sandy loam soil in Red River Parish shows that 300 pounds of 5-8-8 applied under oats in the fall and top-dressing with 100 to 200 pounds of nitrate of soda in the spring are more profitable than top-dressing with 200 to 300 pounds of nitrate of soda alone. Two hundred pounds of nitrate of soda per acre were most profitable in a test in Franklin Parish.

In a cotton variety test conducted in St. Helena Parish, Miller 919, Coker W.R.-4, and Dixie Triumph 366 produced the most profitable yields.

A corn variety and hybrid experiment conducted in St. Helena Parish showed that the best hybrids are superior in yield to the open-pollinated varieties. Coker Prolific was the highest-producing, open-pollinated variety. Louisiana hybrids 468, 173A, and 1030 produced higher yields than any of the other hybrids or varieties tested.

A soybean variety test was conducted on the Macon Ridge in West Carroll Parish in which the Mamotan 6680 and Acadian beans made the highest yields of seed, and the Avoyelles and Mamotan 6680 made the highest hay yields.

## **The Retention of Phosphates by Soils . . . F. L. Davis**

Due to the chemical nature of combined phosphorus, the retention by soils of the phosphates applied in fertilizers, their solubility and consequent availability to growing plants differ from that of the nitrogen, potassium, and calcium also commonly applied in soil amendments and fertilizers. While nitrogen in the nitrate form and the forms of potassium and calcium usually contained in fertilizers are relatively soluble and are held loosely by soils, phosphate are usually rendered insoluble and are held much more strongly. They are commonly said to be "fixed" by the soil. This difference often results in a utilization by the growing crop of no more than 20 to 30 per cent of the phosphate applied, while from 70 to 90 per cent of the nitrogen applied in fertilizers may be utilized by the crop or leached out of the soil by rain water. The extent to which phosphates are fixed or changed to forms that are difficultly available to crops depends to a large degree upon the nature of the soil to which they are applied. Thus the questions arise as to (1) what are the soil constituents which are responsible for the retention of phosphates, (2) what are the

relative magnitudes of these constituents in Louisiana soils, and (3) how can the soils be treated to improve their phosphate fertility?

These problems are being studied in the laboratory. Data obtained to date on a virgin Hammond very fine sandy loam indicate that phosphates added in the form of monocalcium phosphate (which is the predominating form of phosphate in commercial superphosphate) are absorbed as an anion by the colloidal complex of the soil. This form of fixation has been described as a replacement of the hydroxyl ions of the soil by the phosphate ions. The phosphate reacts with or is combined by the soil in the form of the monocalcium phosphate,  $\text{Ca}(\text{PO}_4)_2$  - - ion or the dicalcium phosphate,  $\text{Ca}(\text{PO}_4)$  - ion; and also, apparently, at reactions above pH 7.2 as calcium carbonate-phosphate. The occurrence of this type of reaction is shown by (1) an increase in the cation exchange capacity of the soil produced by adding monocalcium phosphate and (2) a direct linear relationship at reactions below pH 7.0 to 7.2 between the increased cation exchange capacity of the soil and its hydroxyl ion concentration. The increase in cation exchange capacity not only depended upon the amount of monocalcium phosphate added but was also approximately equivalent to the calcium carried in the calcium ortho-phosphate.

Studies of the solubility of phosphates added to this soil show that liming decreases the water-soluble phosphorus but increases the amount of phosphorus that can be brought into solution in  $\text{CO}_2$ -saturated water. The amount of phosphorus retained by the soil after extraction with water saturated with carbon dioxide is decreased by liming. Since carbon dioxide dissolved in water forms a weak acid which has about the same dissolving capacity as that exerted by plant roots, liming acid soils to a reaction of near pH 6.5 would markedly increase the availability to plants of phosphates subsequently added in fertilizers.

## Investigation of Dallis Grass Improvement . . .

C. R. Owen

Experiments have been conducted at Baton Rouge and at two other locations in the State during the past two seasons comparing the yield and quality of seed produced by certain strains of Dallis grass. These strains were isolated by plant selection. The results show that seed production capacity may be materially increased by this method of breeding. Although the work with analysis is incomplete, it suggests that high total seed yields may or may not accompany increased viable seed content. Several strains which have not been outstanding in yield have borne seed with a high content of viable

seed. Certain strains high in total seed production also produce seed high in quality for the species. Most strains isolated have relatively high content of florets infected by ergot. And many have about as many empty glumes in which no seed developed as they have ergoty seed. Naturally variations in the percentage of filled or viable seed is followed by a corresponding difference in the other



Plant types found in the progeny of a selection from plantings of native Dallis grass seed.

fractions. Generally, strains studied up to now do not appear to follow any definite pattern in this. The percentage of the fractions in any particular strain has been relatively constant from season to season, but appears to be affected somewhat by weather conditions during seeding period. At Baton Rouge the strains have been consistent in yield with some exceptions. Certain strains which were outstanding at Baton Rouge may not be so well suited to other sections of the State. More information is necessary for the formation of definite conclusions.

In a progeny test planted in 1944, out of the 144 selections 26 segregated for plant type. Of the segregates the most noticeable were the very weak plants which grew in space-planted rows along with normal plants. The accompanying photograph illustrates these types. This test was space-planted in 3½ foot checks and formed a 12 x 12 triple lattice design. Variation between plants within cer-



tain progeny was definitely greater than between progeny. And the difference between the mean yields of progeny was highly significant.

The material used in the progeny test was selected from plantings made from native seed. There was no control of pollination in the parents. Preliminary studies in pollination indicate that natural crossing is not more than two percent. As a matter of interest, one strain in which such wide variation for plant type occurred also carried a recessive mutant marker. Although the seed of the parent plant was produced in a field of plants showing the dominant allele, all off-type plants bred true for the recessive character. Further, it was found that a number of these weak plants produced no fertile seed during the entire season. This is perhaps suggestive of fertility variation to the extreme in the negative direction and that this characteristic may occur in varying degrees in this species. No individuals have been found up to now which approach complete fertility, but variations from 0 to 45 per cent viable seed have been observed at Baton Rouge.

## **Fertilizers for Rice . . . R. K. Walker and M. B. Sturgis**

In a type of experiment which was more extensive than those conducted in the past, located 6 miles northwest of Crowley on Crowley silt loam, excellent results were obtained from the application of fertilizers to rice. The use of 300 pounds per acre of 6-9-9, 9-9-6, 9-6-9, and 6-6-6 drilled in at planting increased the yields of rice 7.1, 6.8, 6.0, and 6.0 barrels of rice per acre respectively. The use of 200 pounds per acre of 4-12-8 drilled in at planting plus top-dressing, applied after removing the water 10 days before heading, with 18 pounds per acre each of nitrogen,  $P_2O_5$  and  $K_2O$  in combinations gave, in one case, 200 pounds of 4-12-8 plus top-dressing of 300 pounds of 6-0-6, and increase of 5.4 barrels of rice per acre. The effects of the top-dressings were more irregular and less productive than the applications at planting.

This experiment and the results from previous experiments show that rice can be profitably fertilized where good weed control is secured. On the lighter colored silt loams which are low in organic matter, applications of 300 or more pounds per acre of 6-9-6, 6-8-8 or 8-8-8 could be expected to give 3-7 barrel increases. On the darker colored silty clay loams, clay loams and soils recently planted to rice, 200-300 pounds of 4-12-8 or 5-10-5 could be expected to increase the yields 3-5 barrels per acre.



## Pasture-Rice Rotation Experiments . . . R. K. Walker and M. B. Sturgis

The establishment of improved pastures which are profitable within themselves and the turning under of sods from these pastures before rice offers great opportunities to cattlemen and rice growers.

The plan of these experiments includes four experiments located at widely separated points, not over one in any parish, of the prairie rice area. The value of seeding, mowing, fertilizing and liming in the establishment of pastures has been tested. Seeding, mowing, and the application of fertilizers have been found necessary in all cases in the six experiments which have been conducted. The most productive seed mixture used was 6 pounds of white clover, 15 pounds of Dallis grass, 3 pounds of Bermuda grass and 15 pounds of lespedeza per acre. Good stands were obtained by seeding at dates from November through February on firm well prepared seedbeds. Three mowings are required the first year after seeding. Two mowings annually are sufficient in the second and later years to control weeds and maintain succulence. The drilling in before seeding of 400 pounds per acre of 3-12-12 or 4-12-8 and the application of 200 pounds per acre of 0-12-12 or 0-14-7 to the scarified sods in early March for the second and third year after seeding have been proven to be excellent practices. In three out of the six experiments, liming was found to be necessary. If the pH of the soil is less than 6.0 or the base saturation is below 75 per cent, lime should be applied. Applications of 1.0 to 1.5 tons of finely ground high grade limestone disced in during the preparation of the seedbed have satisfactorily corrected the soil reaction in the acid areas experimented with thus far.

The results from grazing these experimental pastures show that the improved pastures provided good to excellent grazing for 230 to 250 days annually. The check pastures which were mowed but not seeded or fertilized produced 15 to 95 pounds of beef per acre during the 8 month grazing period. The pastures which were seeded and mowed produced 25 to 145 pounds of beef per acre and those which were mowed, seeded and fertilized or fertilized and limed produced 220 to 295 pounds of beef per acre. The value of liming where it was needed varied from 70 to 145 pounds of beef per acre. The value of fertilizing varied from 100 to 190 pounds of beef per acre annually.

The importance of increasing the productivity of the soil by turning under sods from improved pastures was shown at a location on Crowley silty clay loam 5 miles south of Abbeville. Pastures which had been established and grazed for two years were turned under

and the land disced and planted to rice. Rice after the check pasture which had not been seeded, fertilized, or limed produced 15.2 barrels per acre. Rice after the improved pasture which had been seeded, fertilized and limed produced 21.7 barrels per acre. The previous annual yield of beef on the unimproved pasture was 85 pounds per acre while that on the improved pasture was 220. The net profit from increased beef and rice production derived through pasture improvement and rotation for the three year period was 41 dollars per acre. The rotation of improved pastures with the rice is the most practical means of increasing the productivity of the soils in the rice area.

## **Louisiana Soybean Research . . . John Gray**

Late maturing soybean varieties usually yield more green matter for forage or for turning under. In tests at Baton Rouge some of the late maturing types produced satisfactory seed yields as well. Seed of the Pelican, Acadian and L. Z. varieties, released in recent years, is being increased over the State. It is hoped that these varieties will not be grown for turning under until sufficient seed is available for general use.

### **Non-Shattering Soybean Varieties**

Since soybeans compete with other crops for labor during harvest time, non-shattering varieties that will hold their seed when left in the field until they can be harvested are desirable. A comparison was made of normal and delayed harvest at Baton Rouge. One series of plots in the late maturing soybean test of 1943 was left standing in the field until January 10, 1944, when it was harvested. Three other series of the same varieties had been harvested in the fall during October and November. Several varieties, particularly the L. Z., Acadian, and Pelican, were outstanding in their ability to hold the seed in the pods until harvested in January. This illustrates the non-shattering qualities of some of the newer varieties of soybeans, but it is not intended to imply a recommendation for delayed harvesting of soybeans. All varieties should be harvested as soon as possible after maturity if the highest quality of seed is to be obtained.

### **Medium Early Soybean Variety Test**

A medium early soybean test is being continued in an effort to obtain earlier varieties adapted to the production of seed for crushing. The group consists of selections of new varieties and strains introduced from other countries by the U. S. Department of Agriculture as well as some varieties from nearby states. Yellow-seeded selections are being

made in strains having mixed seed. There are several varieties in this group showing some promise although yields of the earlier varieties have not been very dependable from year to year as a group. The 104881 is a Louisiana selection meriting increase for trial by farmers. It matures early in October and has produced a creditable amount of forage and seed for the past ten years at Baton Rouge.

## Louisiana Oats Variety Tests . . . John Gray

The Louisiana Experiment Stations have been cooperating with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture for years in an effort to develop varieties of oats adapted to Louisiana conditions. Many "rustproof" types tested failed to be rustproof under heavy early epidemics of leaf rust. This was particularly true for central and southern Louisiana. Epidemics of leaf and stem rust have not been as frequent nor as severe in north Louisiana. The red rustproof types are high yielders and when they escape heavy early epidemics of leaf rust, they produce satisfactory yields. For this reason, susceptible varieties may make satisfactory yields during certain years in north Louisiana although they would not be considered safe in the central and southern parts of the State. Since seed produced in north Louisiana is often sold in south and central Louisiana, highly resistant varieties are desirable for the entire State. Of the varieties being grown commercially, satisfactory yields were obtained from Camellia, Letoria, Ranger, Fultex, Appler, Lelina, DeSoto, and Rangler. Several Louisiana and U. S. D. A. strains have shown merit.

Varieties showing high resistance to leaf rust and also good yielding ability include the Camellia and Fulghum HC 726 x Bond, as well as some Louisiana Station strains. These varieties are not resistant to stem rust. Varieties highly resistant to stem rust include C. I. Nos. 3720, 3989, 4000, 4095, 4322, and Reselection 2802 of C. I. 3717. Exceptionally strong awns on the grain of some of these may prevent their becoming popular varieties commercially. While stem rust has not been as prevalent as leaf rust, resistance to both rusts is highly desirable.

The Alber variety, released a few years ago, has shown resistance to leaf rust and has produced excellent yields in tests at Baton Rouge. It is one of the best red rustproof types.

## ***Dairy Research***



### **Iodine Compound Given Trial . . . D. M. Seath, Cecil Branton and A. H. Groth**

Two carefully controlled feeding trials produced evidence that the compound, iodinated casein, when fed to dairy cows at the rate of 12 to 20 grams per cow daily, increases milk yields and butterfat test. In one trial this increase continued throughout the entire experimental periods of 7 and 8 weeks; while a second trial over a longer period gave production increases for only 5 weeks, with abnormal declines in milk and butterfat production occurring thereafter. The iodinated casein tended to speed-up metabolism, as evidenced by higher pulse rates, averaging 10 and 13 beats per minute higher than control cows in the two experiments. Body temperatures also averaged higher. This was particularly true during the warmer weather. As an example, the increase was 1.27°F during a period when atmospheric temperatures averaged 88.2°F; whereas, it was only 0.14°F higher for a period when 70.2°F. was the average atmospheric temperature. The accelerated metabolism was accompanied by losses in body weight and, with some cows, the loss was excessive. Until more is known about the proper use of iodinated casein it cannot be recommended for general use in dairy rations.

### **Heat Tolerance Is Being Studied . . . D. M. Seath and G. D. Miller**

How cows of the Jersey and Holstein breeds respond to changes in atmospheric conditions during summer months is now under study. Data secured from the University herd during the summer and fall of 1944 indicate that cows are definitely affected by changes in atmospheric temperatures, and that there is a distinct difference between breeds and between cows within breeds in their tolerance of heat. The body temperatures increased or decreased in line with changes in atmospheric temperatures. The increases in body temperatures were less with Jersey cows than with Holstein cows. One group of Holstein cows having the same sire showed significantly smaller increases in body temperature due to summer heat than did groups of cows by other sires. Also, respiration rates tended to be faster for the



daughters of one Jersey bull (dark in color) than for groups of daughters by other Jersey bulls. These observations suggest the possibility of developing through breeding and selection strains of Jersey and Holstein cows that can better withstand hot weather.

Body temperature and respiration rates tended to be lower during cloudy and rainy days. The cows also grazed more during such days. Future work will be designed to test methods of keeping cows more comfortable, thereby causing them to eat more feed during summer months. The success of such an experiment will be measured in terms of increased milk production.

## **Mineral Deficiencies of Louisiana Dairy Herds —**

L. L. Rusoff, D. M. Seath and Joan Bahm

The controlled mineral-feeding experiment involving 5 milking cows and 10 heifers has been in progress for one year.

Results to date have indicated that the heifers receiving mineral supplementation have shown a slightly greater increase in weight than those in the basal control group receiving no mineral addition.

The blood picture for all groups is as follows: Average blood calcium values are all slightly below the average normal value of 10.5 milligrams per 100 c.c. of blood plasma, while the average inorganic blood phosphorous values are much higher than the average normal of 4.5 milligrams per 100 c.c. of blood plasma. The animals receiving the calcium supplement (oyster shell flour) showed the highest blood calcium value (10.24 milligrams), and the blood calcium to phosphorous ratio for this group was 2 to 1, which is considered normal. The calcium to phosphorous ratios for the other groups were about 1.5 to 1.

Milk production and butterfat yields have indicated no significant differences due to mineral feeding so far.

All animals have been bred by artificial insemination and their breeding record is better than average. A few of the animals have calved.

Either cottonseed meal or blood meal is used as the protein supplement, and cracked corn, salt, and native grass hay, which is extremely low in calcium and phosphorous, make up the basal ration. Mineral supplements include oyster shell flour, which supplies the calcium; mono-sodium phosphate, the phosphorous; and bonemeal, the calcium and phosphorous. At least one animal in each group receives shark liver oil as a source of vitamin A, and during the day all animals are outside in a dry lot.

The native hay is low in carotene value (vitamin A) but so far no vitamin A deficiency in the animals not receiving any vitamin A supplement has manifested itself.

The experiment will be continued until all the animals have completed at least one lactation period.

## Blood Studies — L. L. Rusoff, P. L. Piercy and R. F. Gaalaas\*

Blood from 16 Jersey and Holstein cows of the L. S. U. dairy herd\*\* and 16 Jersey cows of the Bureau of Dairy Industry, U. S. D. A. dairy herd of the Iberia Livestock Experiment Farm, Jeanerette, La., is being obtained each month to establish an average blood picture for Louisiana dairy cows fed under better than average feeding practices.

The monthly averages of blood calcium and blood inorganic phosphorous values for eight months are shown below.

HERD	BLOOD PICTURE				
	RANGE		AVERAGE		RATIO Ca/P.
	Ca. mg/100cc	P. mg/100cc	Ca. mg/100cc	P. mg/100cc	
L. S. U.	8.34-11.73	4.58-6.94	10.52	5.65	1.86:1
Jeanerette	10.16-12.15	4.56-5.76	11.23	5.13	2.2 :1

## Poisonous Principle from *Crotalaria spectabilis* Isolated — L. L. Rusoff and P. L. Piercy

The toxic principle, an alkaloid, was isolated from the young tender plant of *Crotalaria spectabilis*. This was found to cause death when injected into experimental animals. Details of this research are reported under the Veterinary Science Department section.

## Artificial Breeding Gives Promising Results . . . D. M. Seath, G. D. Miller, and A. H. Groth

A small-scale artificial breeding project has given preliminary results which are, in general, encouraging. During an 18-month period ending December 31, 1944, a total of 210 artificial inseminations has been made. Reports on 152 inseminations showed that 94, or 62% of them, had resulted in pregnancies. Of the 94 pergnancies,

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\*\*Dairy Department, L. S. U. College of Agriculture, cooperating

71% required one insemination; 19% two; 4% three, 3% four; and 3% required either five or six. These results are as good or better than the average results reported from natural breeding.

Records on the relationship of time elapsing since cows were first observed in heat and the time of insemination indicated that the best results were secured when breeding took place 13 to 30 hours after on-set of heat. The comparisons on this basis for 121 inseminations on which records are available follow:

Hours since first noted in heat	Number of Inseminations	Percent resulting in pregnancy
Unknown	25	48
Under 7	18	61
7-12	39	62
13-18	20	75
19-24	12	67
25-30	7	100

The seven animals in the 25 to 30 hour group with its 100% record is too small a number from which to draw conclusions.

Samples of semen were collected in an artificial vagina either once or twice weekly from one or two Jersey bulls. Great variability in the quality of the semen was noted, with a definite trend toward low quality in late summer and early fall. It was found that bulls usually lacked a desire to serve during periods when their semen rated low in quality. One bull failed so consistently in furnishing good semen that it was necessary to replace him with another bull. Semen samples were diluted at the rate of 1 part to 4 parts of egg yolk-citrate diluter and stored at a temperature of 40° to 45° F. prior to usage. More than one-half of the cows were inseminated from samples less than 1 day old. Such samples in general proved more efficient in impregnating cows than did samples more than 1 day old. A comparison follows:

Age of semen sample (days)	Number of Inseminations	Percent resulting in pregnancy
Less than 1	67	76
1	18	61
2	22	41
3	9	44
4	2	100
5	1	0
6	1	0

The fact that the 2 cows inseminated with 4-day old semen became pregnant even though it involved only 2 trials, indicates the danger of concluding that a fresh sample was necessary to get satisfactory

results. When high-quality semen was secured it was successfully used after storage up to 4 days.

Efforts to properly evaluate the relative quality of semen by microscopic examination, noting motility, dead sperm, etc., have been partially successful. The use of the methylene blue reduction test gives promise of aiding in a more accurate evaluation

A majority of the cows artificially bred were family cows. These small units reduced the number of cows bred from each semen sample to an average of 2.5. These family cows often consisted of animals that had milked 12 or more months before being rebred. This fact may have lowered their average breeding efficiency. Thirteen Jersey cows and heifers being used for a mineral deficiency experiment when bred artificially required 18 inseminations for 13 pregnancies; thus 72% of the inseminations were successful, as compared to the 62% average for all cows. The close observations made possible on these experimental cows may account for their better average record.

The experimental evidence to date indicates that some of the essentials for a successful artificial breeding unit include (a) scientifically trained operators, (b) several bulls known to produce high-quality semen, (c) the adoption of scrupulously clean methods of handling modern-designed instruments, and (d) the organization of enough farmers to furnish several thousand cows for breeding.

## Grazing Secured During Nine Months . . . D. M. Seath and L. L. Rusoff

During 1944 grazing by milk cows on the B. P. Alford test<sup>1</sup> at Mt. Hermon started on February 18 and ended on October 27. An average of 10 cows grazed the 9.5 acre area, which was divided into 2 main pastures and these subdivided into parts broken and not broken in the fall of 1943. This arrangement permitted rotational grazing. A summary of the year's grazing follows:

	East Field (Fertilized for 4 years)	West Field (Fertilized for 8 years)	Percent Increase
Days grazed	112	141	26
Cow days per acre	205	272	33
Milk per acre	2480*	3523*	42
Milk value @ \$3.50 cwt.	\$86.78	\$122.53	41
Grain supplement per acre	804	995	24
Value grain supplement	\$23.40	\$28.95	24
Return over grain cost per acre	\$63.38	\$93.58	48

<sup>1</sup> Soil type, as classified by Soil Conservation Service, consisted largely of Paden very fine sandy loam and Cahaba fine sandy loam.

\*Milk per acre was smaller than for 1943, largely because Mr. Alford sold his best cows and replaced them with lower producers. In spite of this, both fields averaged 85% more milk than in 1937, the first year of the experiment.



Clippings from 10 protected areas were made three times during the year. They showed yields averaging 12.1 tons of green herbage or 4 tons of air-dry hay per acre. When transformed to nutrients this yield would be equivalent to 80 bushels of corn per acre.

This test has been conducted for 8 years and during the first 4 years one-half of the area was not fertilized. Since that time the entire area has been limed (1 ton per acre in fall of 1941 and 2 tons per acre in the fall of 1944.) Each odd year since 1940, 100 pounds calcium metaphosphate per acre have been applied to the entire pasture with one-half the area receiving 100 pounds of 48% muriate of potash per acre.

General improvement in the stand of clovers, Dallis grass and Bermuda grass has been noted from year to year, although carpet grass still covers more area than any other plant during the summer and fall. One-third of the area was completely broken and reseeded in the fall of 1943. This greatly increased the stand of white Dutch and hop clovers, but did not apparently add to the total grazing. Rather, it delayed early spring grazing, but partially compensated for this delay by producing herbage which was greener and more succulent in late summer. Analyses of clippings showed 23.9% more protein in herbage from areas broken than from those not broken.

## **Hammond Renovation Experiment . . . D. M. Seath and W. F. Wilson, Jr.**

A spring clover and Dallis grass experiment on Hammond sandy loam involving 3 fertilizer treatments, 3 renovation procedures, and 3 replicates, has been in progress since the fall of 1941. The treatments used semi-annually were: (1) 48 units  $P_2O_5$  (phosphoric acid), (2) 96 units  $P_2O_5$ , and (3) 48 units  $P_2O_5$  + 48 units  $K_2O$  (potash). Triple superphosphate was used as a source of phosphate and muriate of potash for the potassium. The entire area was limed at the rate of 1 ton per acre in the fall of 1940.

The renovation procedure provided for: (a) plowing and reseeding every 2 years; (b) plowing and reseeding every 4 years; and (c) no plowing or reseeding after fall of 1941.

Yields of air-dry herbage during 1944 showed practically the same results for fertilizer treatments 1 and 2, i.e., 2.08 and 2.07 tons

per acre. Treatment 3, which included potash, averaged 2.33 tons per A or 12.3% more than without potash.

The parts renovated in the fall of 1943 averaged 2.42 tons per acre or 19.9% more than parts not renovated.

Observations made throughout the year showed clearly that potash fertilizer resulted in better clover and Dallis grass stands. Renovation, likewise, greatly improved the stand of clovers.

## McEwen Test Has Excellent Pasture — D. M. Seath and L. L. Rusoff

Applications of lime, phosphate, manure, and potash have made it possible to produce excellent permanent pasture consisting of clovers, Dallis grass, and carpet grass on three experimental fields of the Mrs. H. M. McEwen farm near Bogalusa<sup>2</sup>, Louisiana. Each field has been limed just once; either 3 tons of paper mill sludge or 1 ton of agricultural lime was applied. The phosphate, potash and manure have been applied semi-annually, with all but one part of main pastures treated with 200 pounds per acre of triple super-phosphate. One small part of one pasture received basic slag. One-half of two test pastures was treated with 100 pounds per acre of 48% muriate of potash, and one-half (divided in opposite direction) receiving 7 tons of manure per acre.

Clippings made at three periods of the 1944 growing season from protected areas in two test pastures averaged as follows:

Treatment	Tons per acre		Percent protein on* air-dry basis
	Green wt.	Air-dry wt.	
Lime + phosphate	8.8	3.06	12.12
Lime + phos. + potash	14.9	4.12	13.86
Lime + phos. + manure	15.6	4.46	14.81
Average	13.1	3.88	13.60

Observations gave convincing evidence that both manure and potash were necessary in order to get the best stand of pasture clovers. The areas receiving manure also retained their green succulent growth longer during the season and had better stands of Dallis grass than did non-manured areas. It also contained 16.64% more protein than herbage from non-manured areas.

<sup>2</sup> Classified by Soil Conservation Service as Paden very fine sandy loam, Kalmia fine sandy loam, and Stough very fine sandy loam.

\*Protein analyses of herbage were made by Fertilizer and Feed Stuffs Laboratory.

Small plots designed to measure differences in treatments and started in the fall of 1942 gave yields in 1944 as follows:

Treatment	Tons per acre	
	Green wt.	Air-dry wt.
Phosphate	8.6	2.90
Phosphate + Lime	12.9	4.62
Phosphate + Lime + Potash	12.9	4.04
Basic Slag (@ 600# per acre)	11.1	3.86
Basic Slag + lime	13.4	4.17
Basic Slag + lime + potash	10.3	3.82

The highest yield of herbage secured from any of the experimental areas was 18.2 tons green matter or 5.53 tons of air-dry hay per acre. This yield in terms of digestible nutrients is equivalent to approximately 110 bushels of corn (in shuck) per acre. This particular area received paper mill sludge in 1941, plus triple superphosphate and manure in 1941 and 1943. The pasture cover consists of excellent stands of white Dutch clover and Dallis grass with some carpet grass.

## Manure Revives Stands of Clover and Dallis Grass . . .

D. M. Seath

The McEwen experiment furnished an example in 1944 of how barnyard manure helped revive an established permanent pasture. In this trial barnyard manure was applied to the sod of an established pasture during November of 1943. It was a pasture that once had a good stand of clover and some Dallis grass, but carpet grass had more or less gained control in 1943. Phosphate fertilizer was applied to the entire pasture but the manure to only-half of it. During 1944 a remarkable change was evidenced in the pasture. Phosphate alone helped a great deal, but where phosphate and manure had been applied there was an almost perfect stand of clovers and Dallis grass present. The manure also extended the green succulent grazing period over a longer period than where phosphate was used alone. Clovers were present during most of the grazing season.

## First-Year Clover Yields High at Leesville , . . D. M.

Seath and G. A. Luno\*

Heavy fertilization, including the use of lime, phosphate, potash, and barnyard manure, produced, a record yield of 13.2 tons of green herbage per acre on coastal plains "piney-wood" land<sup>3</sup> near Leesville.

<sup>3</sup> Soils classified by Soil Conservation Service as belonging to Forrested Coastal Plains group varying from Tabor fine sandy loam to Ruston very fine sandy loam.

\*County Agricultural Agent at Leesville.





Clover plot near Leesville produced a record yield of 13.2 tons per acre (green wt.) after being treated with manure, lime, phosphate, and potash.

These results, as recorded in April, were from a pasture seeded to white Dutch, Persian, and hop clovers in October of 1943 on the J. Ruffin Packer dairy farm. The clover yield, when reduced to an air-dry basis, was equivalent to 2.9 tons, which has feed nutrients equal to 58 bushels of corn per acre.

The application of barnyard manure showed an average increase in yields of 4.5 tons of green clover, or 0.77 tons on the air-dry basis. Increases due to the use of potash averaged 3.5 tons green clover or 0.88 tons when air-dry. For lime the increase was 3.1 tons in green weight or .41 tons on air-dry basis.

Clover seeded on a well prepared seed bed, which included plowing, disking, harrowing, and packing, produced an average of 9.2 tons of green or 2 tons of air-dry herbage per acre, as contrasted to a yield of 4.2 tons green and 1.06 tons on air-dry basis, with no seed bed preparation. Manure was used to cover the seed in the latter case, while the manure was mixed into the seed bed in the first case.

## **Pasture Clovers Produce High Yields at DeRidder . . .**

D. M. Seath and A. D. Fitzgerald\*

Barnyard manure, when combined with lime, phosphorus, and potash fertilizers resulted in excellent first-year yields of spring



clovers (white Dutch, Persian and hop) on the Fred Tenney dairy farm<sup>4</sup> near DeRidder, Louisiana. Experimental plots thus treated averaged 10.2 tons of green herbage or 2.3 tons on an air-dry hay basis. Check plots receiving no fertilizer averaged only 0.7 of green matter or 0.3 tons of hay per acre. Very little of the herbage present on check plots consisted of clovers. Yields data were secured from clippings made in April.

Plots treated with manure at time of seeding in October 1943 resulted in yields averaging 7.6 tons of green herbage, as compared to 3.5 tons per acre from plots not manured. In terms of air-dry herbage this was equal to 1.84 tons with manure and 0.98 tons without manure. Various commercial fertilizers were used on both the manured and non-manured plots, with highest yields resulting where phosphorus, lime and potash were applied.

The ReDigger area is not considered as being a "natural" clover area; thus, the above results are to be construed as only indicative of what can be expected during a good clover year (ample rainfall, etc.) where heavy fertilization is practiced. Likewise, the results given are for the first year following seeding. Future results will show how well the clovers are able to reseed themselves and produce profitable yields from year to year.

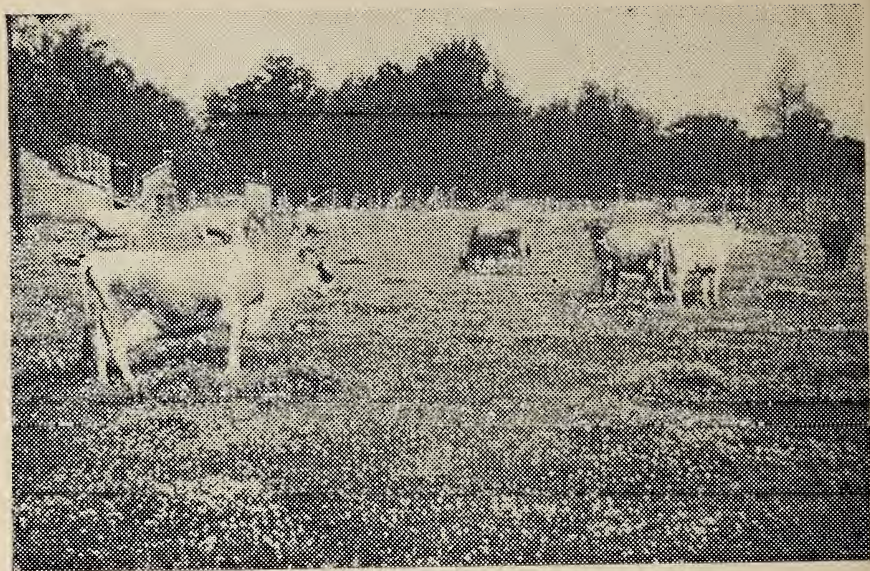
## **Dallis Grass Does Best on Fertilized and Plowed Seedbed . . . D. M. Seath and A. D. Fitzgerald\***

Observations made during 1944 gave convincing evidence at the Fred Tenney experiment<sup>4</sup> that both seedbed preparation and fertilization affected the stand and growth of Dallis grass grown in combination with either clovers or lespedeza. Best results were observed where the original seedbed was thoroughly prepared, including plowing. Where plowing was omitted and the harrow, or disk and harrow were used to prepare the seedbed, very little or no Dallis grass resulted from seedings made in either February or October of 1943. The results secured are in line with those secured near Hammond, Louisiana, as reported in the 1941-1942 Station report.

The plowed plots when fertilized with manure, phosphorus, and lime produced good stands of Dallis grass. In some cases it appeared that potash fertilizer produced further improvement to the above fertilizer combination. Fair stands of Dallis were secured on the

<sup>4</sup> Soils classified by Soil Conservation Service as belonging to Forrested Coastal Plains general group and varying from good grade Bowie to Ruston Fine sandy loam with heavy subsoil.

\*County Agricultural Agent at DeRidder.



Washington Parish pasture.

plowed plots treated with either phosphorus or phosphorus and lime fertilizers. Unfertilized plots produced practically no Dallis grass.

## Second-Year Lespedeza Results on Tenney Farm<sup>4</sup> . . .

D. M. Seath and A. D. Fitzgerald\*

Dry weather during the growing period reduced second year yields of lespedeza, yet the results secured showed the same general effect of fertilization as reported for last year in the 1942-43 Station report. The average yields from a series of plots, as listed below in terms of air-dry hay show, in general, a beneficial effect due to

	No Manure	Air-Dry Hay Per Acre With Manure	Average
Check	.84	1.30	1.07
Phosphorus	1.43	1.42	1.42
Phosphorus + lime	1.60	1.46	1.53
Phos. + lime + potash	1.74	1.51	1.62

fertilization with phosphorus, lime and in one case with potash fertilizer. Manure apparently did not increase yields, except in the case

<sup>4</sup> Soils classified by Soil Conservation Service as belonging to Forrested Coastal Plains general group and varying from good grade Bowie to Ruston Fine sandy loam with heavy subsoil.

\*County Agricultural Agent at DeRidder.

where it was used alone. This is in contrast with the general beneficial effect of manure on clovers and Dallis grass produced on this same farm.

## **Dehydrated Sweet Potato Flour in Ice Cream . . .**

A. J. Gelpi\* and P. W. Kennedy\*

Preliminary trials with dehydrated sweet potato flour indicate that this product might successfully replace part of the non-fat milk solids in commercial ice cream. With milk solids available to the ice cream manufacturer limited by the federal government for the duration of the war, the ice cream industry has tried many substitutes other than sweet potato flour with varying degrees of success.

Experiments have shown, thus far, that as much as 3% of sweet potato flour can be used to replace an equal amount of non-fat milk solids and still obtain a satisfactory finished product as to flavor, body, texture, whipping properties, and stability. Results also indicate that the sweet potato flour may replace part or all of the binder such as gelatin which is used to secure stability.

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\*Associate Professor and Creamery Manager, respectively, of Department of Dairying, College of Agriculture.



# Entomology



## Tests With DDT Conducted During 1944 . . . C. E. Smith, A. L. Dugas, T. P. Dutsch and T. C. Barber

The much publicized new insecticide, DDT, was used in tests against several important field, vegetable, fruit, household and animal pests during 1944. Although many of the results obtained were outstandingly promising, they do not warrant any final conclusions and are not considered as furnishing a basis for making any recommendations. Some of the more important insects DDT was tested against with a brief indication of the results obtained follow:

**Tomato fruitworm:** DDT gave very promising results on fall tomatoes against this insect. A 3% dust in combination with an insoluble copper compound was used.

**Tomato hornworm:** According to an observation made, DDT was ineffective against a *Protodice* sp. that infested fall tomatoes at Baton Rouge in 1944.

**Pickleworm:** DDT appeared to be toxic in a high degree to this species. A 3% dust was used in combination with an insoluble copper compound and free nicotine.

**Oriental fruitmoth:** A 1% emulsion and a 5% dust were used in a test for the control of this insect. The results indicated that the spray was partially effective, whereas the dust was relatively ineffective.

**Striped Blister Beetle:** In several cage tests, 5 and 10% DDT were 100% effective. In field tests, comparable results were obtained.

**Southern Green Stinkbug:** DDT, 5 and 10% dusts, were 100% effective in cage tests. Several dead bugs which were probably killed by the insecticide were observed under DDT treated plants in the field.

**Sweet Potato Weevil:** DDT, 3% dust, was relatively ineffective against the sweet potato weevil in a field test.

**Sugarcane Borer:** In tests designed to compare the relative effectiveness of DDT and cryolite against the sugarcane borer, it was found that DDT was not nearly as effective as cryolite. In one test, the application of 3% DDT actually resulted in an increase in the



borer infestation as compared to the undusted check. This was apparently due to its lethal effect on *Trichogramma*, an important egg parasite of the borer.

**Velvetbean Caterpillar:** The results of one year's experiments on the control of the velvetbean caterpillar on soybeans and peanuts indicated that DDT was very effective against this pest as well as against the various leaf beetles which are common on soybeans.

**Pea Weevil:** About one-half bushel of seed beans infested with the pea weevil was treated with two ounces of 10% DDT dust. No live weevils were found in examinations made four and nine days after the treatment, or in occasional examinations made during the following five months.

**Flies:** Two animal houses, the inside walls, ceilings and other structural parts, were sprayed twice, 30 days apart, with a 1% oil solution of DDT. The flies contacted with the spray were knocked down instantly and died in a few minutes. The effectiveness of the first application lasted about 30 days. Animals sprayed with the same solution remained relatively free of flies for about one week. Dust treatments of DDT appeared to be relatively ineffective.

**Fleas:** A number of dogs, a dog house and beneath a dwelling infested with fleas were treated with either a 5% oil solution or 10% DDT dust. Both materials were 100% effective. The dogs and houses so treated were still free of the pest 30 days later.

**Bedbug:** One or more bed rooms in three houses infested with bedbugs were treated with a 5% oil solution, and one room with a 10% DDT dust. The oil solution was 100% effective against all forms including the eggs, whereas the dust failed to give satisfactory control in 36 hours.

**Cockroaches:** A DDT spray, 5% oil emulsion, and a 10% dust were used against the American and German roaches. The spray was effective against the American species but considerably less so against the croton bug. The dust tended to be less effective than the spray.

**Chicken Mite:** A hen house infested with chicken mites was sprayed with a 1% DDT emulsion. No live mites could be found 24 hours after the application.

**Ticks:** A house infested with ticks, probably the brown dog tick, was sprayed with a 1% emulsion of DDT. The results were negative or practically so.

## **Sugar Cane Borer Control . . . A. L. Dugas**

The dusting of sugarcane with cryolite to control the sugarcane borer was definitely established on a practical field basis in 1943. With the extensive application of cryolite dusting, certain problems of no significance in small plot experimental work became increasingly important. The most significant of these was the build-up of populations of the sugarcane aphid, especially following second generation dusting, because of the lethal effects of the cryolite on the natural predators of the aphid.

### **Sugarcane Aphid Not Economically Controlled with Nicotine**

During 1944, considerable effort was directed toward finding an effective control for the sugarcane aphid through the use of an aphicide added to the cryolite. This involved numerous tests to determine the minimum strength of nicotine which would kill the aphid, the most effective form of nicotine, the number of applications necessary for effective control, and, equally important, the effect of nicotine on *Trichogramma*, the valuable egg parasite of the borer.

In hand-gun and plane tests, one and two percent of various forms of nicotine with cryolite were quite ineffective against the aphid. A three percent nicotine dust applied four times at weekly intervals reduced the aphid population to some extent but did not prevent sufficient damage to render a commercial control. A three percent nicotine dust and certainly anything higher would be too expensive for practical purposes.

Sulphur was found to be the most effective material for preventing an aphid build-up, but its toxicity to *Trichogramma* would offer certain limitations to its use. In none of the tests did nicotine affect parasitization by *Trichogramma*.

### **Sodium Fluosilicate Found to Be Very Effective Against Borers in Summer Plant Cane**

The extensive planting of summer plant cane necessitated the initiation of considerable work on the destruction of the abnormally heavy infestation of borers in this type of planting. In an effort to find a material cheaper than cryolite, especially for use on summer plant cane when 5 to 8 applications of dust are necessary, sodium fluosilicate-pyrax (1-1) was found to be even more effective than cryolite. It accounted for a control of 98.9 percent as against 94.6 and 94.4 percent for synthetic and natural cryolite respectively. The burn to cane foliage from the sodium fluosilicate was negligible. The possibilities of this material from the standpoint of cost and effectiveness appear to be very good as a control of the borer. A

three percent DDT dust resulted in an increase in infestation of 15.7 percent.

Five experiments in different varieties of cane for studying the effect of shaving of summer plant at various times on the destruction of overwintering borers and on stand of cane are in progress at the present time.

### **Practical Control Program on a Community Basis Developed Further**

The value of a community program for successful borer control was clearly demonstrated again in 1944. A community program results in a more general clean-up of borers and eliminates reinfestation from untreated cane. Leaving undusted checks on a plantation reduces the ultimate benefit of cryolite dusting by 25 to 50 percent. It is evident, therefore, that the most effective and economical results from cryolite dusting are obtained when organized on a community basis and applied to all infested cane. First generation dusting appears to be more desirable than second generation in a such a program.

### **The Use of Nicotine with Calcium Arsenate to Prevent the Build-Up of the Cotton Aphid . . . T. P. Dutch, C. B. Haddon, J. L. Crigler and T. C. Barber**

During recent years cotton growers have been confronted with the problem of checking the aphid build-up which follows the use of calcium arsenate for boll weevil control. This is due to the destruction of the natural enemies, and especially the predators, of the aphids by the calcium arsenate applications. While calcium arsenate will effectively control the boll weevil, the resulting build up of the aphid population sometimes turns out to be as great a problem, if not more so, than uncontrolled light boll weevil infestations.

Past experiments have shown that nicotine, added to the calcium arsenate, will check the aphid development and not interfere with the poison controlling the boll weevil. It has been found difficult, however, to induce growers to accept and utilize nicotine for this purpose for several reasons. Among these are: (1) the difficulty of mixing the liquid nicotine sulphate with the calcium arsenate; (2) the unpleasant nature of the dust preparation during both the mixing operation and the actual field application; and (3) the additional expense and trouble involved. Factory mixing of the calcium arsenate and liquid nicotine sulphate dust has not been entirely satisfactory on account of the volatile nature of the nicotine requiring air-tight packaging. Suitable containers, metal drums with friction tops, have not been easily available or obtainable under war time condi-

tions. This has also tended to increase the cost of the calcium arsenate-nicotine dust mixture.

In efforts to simplify and improve the mixing and handling methods, as well as to reduce the objectional nature of the nicotine-calcium arsenate dust, two non-volatile dust types of nicotine preparations were tested and compared with the liquid sulphate form during 1944. The forms used were Blackleaf Dry Concentrate, a non-volatile and water-soluble product, and Blackleaf 155, a non-volatile but partially soluble preparation. It was found that equally effective aphid control was obtained with all three nicotine forms, but that the dust types (Blackleaf 155 and Blackleaf Dry Concentrate) were more easily mixed with the calcium arsenate and were less disagreeable for the operator than was the more volatile liquid nicotine sulphate (Blackleaf 40).

With the view of reducing the cost of the treatments and also the disagreeableness involved in making the applications, the calcium arsenate-nicotine dusts were used in alternate applications with the intervening applications consisting of calcium arsenate alone. However, a dust containing 2% nicotine was used instead of the 1% usually recommended for all applications. Although a little more nicotine may be used in the dusting program, the cost of mixing and the number of disagreeable applications were reduced to about one-half.

The results of the tests also indicated that 2% nicotine-calcium arsenate dusts used in alternate applications are just as effective as 1% dilutions applied in all applications. Therefore considerable progress has been made towards simplifying the use of nicotine as a cotton dust, and in removing to a certain degree the objectional features of the insecticide. Further experiments are contemplated during 1945 which, it is hoped, will further clarify the problem of cotton aphid control.

## **Tomato Fruitworm Control . . . C. E. Smith, T. C. Barber and T. P. Dutsch**

In order to grow tomatoes successfully in Louisiana certain insects and diseases, especially the tomato fruitworm and early blight, have to be combatted. Formerly an arsenical-Bordeaux mixture spray was widely used for the control of this insect-disease problem. However, this insecticide-fungicide combination spray had certain disadvantages. The Bordeaux tended to decrease yield and retard maturity of the fruits. The arsenical, especially lead arsenate, the poison



most commonly used, was objectionable because of its double residue hazard, both the lead and arsenic being extremely poisonous to people.

Studies have been started, the purposes of which are to develop a more effective and safer control remedy for this tomato pest. And also with the view of eliminating, if possible, the disease factor from these studies, one of the so-called insoluble copper compounds (Tri-basic copper sulphate) has been used as a basic material in the dust mixtures in which a fungicide was desired. The copper compound was added in amounts equivalent to 6% metallic copper in those dusts containing the ingredient. One experiment was conducted on fall-crop tomatoes in 1944.

Observations and results of this experiment showed that the cryolite-copper and DDT (3%)-copper dust mixtures were about equal in effectiveness, and controlled the tomato fruitworm satisfactorily. These two treatments also were superior to the other five included in the tests. The other treatments consisted of cryolite, undiluted; calcium-lead arsenate and copper; basic copper arsenate and lime, equal parts; calcium arsenate and copper; cryolite and sulphur, equal parts; and the undusted check. The relative effectiveness of these latter treatments was in the order named, though there was practically no difference between the three arsenicals.

Observations also indicated that the superiority of the cryolite-copper, and DDT-copper treatments over the other ones, including the check, was due to a better control of early blight. There appeared to be no difference in the disease infections on the three arsenical-copper treatments and the check. In other words, these arsenical-copper dusts were apparently totally ineffective against early blight.

## **Melon Aphid and Pickleworm Control . . . T. P. Dutsch, T. C. Barber and C. E. Smith**

The study of cucumber insects, especially the pickleworm and melon aphid, which has been in progress several years, was continued during 1944. Soon after the investigation was started, a dust was formulated and a schedule of application developed, which effectively controlled the insects, and also the downy mildew, that affect fall cucumbers in Louisiana. The dust which is generally referred to as "Cucumber dust" consists of the following: Cryolite, 33%; Basic copper sulphate, 12% (6% metallic copper); 10% Blackleaf 10 (1% free nicotine); soft wheat flour, 10%; and Pyrax ABB, 35%. The applications were made at intervals of four or five days starting soon after the plants were up and continued until harvesting was nearly completed.

The free nicotine used in the "Cucumber dust" had certain disadvantages which were increased by war conditions. With the view of possibly substituting a less objectionable form of nicotine in the formulated dust, an experiment was conducted on fall cucumbers, the primary purpose of which was to compare the effectiveness of two non-volatile nicotine preparations with the free form. The nictines used were in dust form and known commercially as Blackleaf Dry Concentrate, a non-volatile and water-soluble product, and Blackleaf 155, a non-volatile but partially water-soluble material. A second purpose was to test DDT and a commercially mixed rotenone-sulphur dust as insecticides against the pickleworm. The latter dust had been reported severely injuring spring cucurbit crops; consequently, it was included in the test especially for observation on plant injury.

The results of the experiment showed that there was not a great deal of difference between the three different forms of nicotine used. The "Cucumber dust" containing free nicotine was slightly less effective than those containing the more stable forms of nicotine. This was probably due to windy weather conditions that prevailed at the time several of the applications were made.

The DDT-copper-nicotine treatment was extremely effective against the insects and mildew, considerably superior to the "Cucum-dust." The plants on the plots of the former were thriftier and more vigorous throughout the period of the experiment. Although the rotenone-sulphur treatment was inferior to all of the other treatments, it was largely because of its failure to control the insects and mildew rather than to plant injury, as might be expected. While this rotenone-sulphur dust mixture did not injure the plants much, if any, under the cool fall weather conditions prevailing during the test, it should not be assumed that the mixture can be used with safety on spring and summer crops when high temperatures prevail.

## **Sand Wireworm Investigations . . . T. C. Barber and C. E. Smith**

For several years an experimental field has been maintained at Ringgold, Bienville Parish, which is in the center of the more heavily wire-worm-infested section of the State, for testing crop resistance, crop rotations, time of planting, cover crops, etc. for sand wireworm control. The field chosen is situated on a somewhat steep sloping hillside. The soil is a light sandy type that was worn out and depleted of organic matter by continuous cropping, mainly corn and cotton, during previous years. Preceding the taking over of the field, several crop

failures resulting from wireworm damage occurred, and examinations at the time showed the soil contained a heavy population of the insect.

**Results of Soil Improvement Experiments:** The field has made a substantial recovery following three seasons of selected crop planting, rotations, etc. In the spring of 1944, good crops of winter legumes were harvested including splendid stands of vetch, oats, Singletary peas, Austrian winter peas and crimson clover. So striking were these results that the local County Agent called a "farmers' meeting" among the farmers of his parish in order to exhibit the growing crops and explain how the improvements had been effected.

During the summer months good crops of peanuts and sweet potatoes were grown, and two sections of the field planted to cotton and June corn gave fair yields. For the second successive year, however, attempts to grow late summer crops including soybeans, crotonaria, etc. failed—not on account of wireworm injury, but owing to the severe midsummer drought preventing the germination of the July-planted seeds. These results strongly indicate that rotations including late-planted summer crops are not suitable to North Louisiana conditions. It has been concluded that summer plantings in that area should not be made later than June 15 to give satisfactory results, and future experimental plantings will be made on that basis.

**Long-Range Rotation Program Outlined:** In a carefully-planned and well-discussed program, compiled during 1944, all crops to be planted on the experimental field for a number of years ahead have been selected and listed, terrace by terrace. This program will include tests of nearly every economically important crop adapted to this section of Louisiana, both legumes and cover-crops during the winter months as well as the standard summer crops for food and cash purposes. Each crop will follow another in a carefully-arranged rotation which will widely separate those crops most susceptible to wireworm damage. The first year of work on this program is now in progress.

## **Velvetbean Caterpillar Control on Soybeans and Peanuts . . . A. L. Dugas and John Gray**

The near failure of the soybean seed crop in Louisiana in recent years because of widespread damage by the velvetbean caterpillar<sup>1</sup> warranted investigations to obtain specific data on the relative toxicity of various insecticides to this pest with the idea of developing a practical control program. It is realized that information on methods of

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<sup>1</sup> *Anticarsia gemmatilis* (Hbn.)

insecticidal application on soybeans, growing with and without corn, as well as the timing of application will be necessary in the practical use of any poison.

The velvetbean caterpillar is a tropical species that appears in Louisiana each year about July. The populations of first and of second generation caterpillars are not generally heavy enough to warrant control measures. However, the third generation, occurring in late August and early September, often builds up to devastating proportions. This pest occurs in the southern part of the state every year in sufficient numbers to defoliate beans, but in some years does not spread northward into the seed producing area in large enough numbers to do extensive damage to the seed crop. However, in recent years it has appeared quite regularly in the seed area, and at present is regarded as the limiting factor in the development of soybean seed production in the state.

Three different tests were conducted in 1944: (1) to compare the relative effectiveness of one and of two applications of various insecticides against the caterpillar on soybeans, and the increase in seed production resulting from control of this insect; (2) to study caterpillar control on a number of varieties of soybeans; and (3) to determine the toxic effect of various insecticides on peanuts.

The results of the main test are presented in the table.

Three percent DDT was found to be slightly more effective than cryolite, but not significantly so. Both cryolite and DDT were far superior to sodium fluosilicate-pyrax (1-1), calcium-lead arsenate, and basic copper arsenate. A second application of dusts did not result in any appreciable gain in yield of beans. One application of DDT and of cryolite accounted for increases in yield of beans of 16.37 and 14.56 bushels per acre. Increases of 8.53, 8.05 and 6.87 bushels followed the application of sodium fluosilicate, calcium-lead arsenate and basic copper arsenate.

In the second test on beans, it was found that cryolite resulted in an excellent control. The first application of basic copper arsenate was so ineffective that cryolite and DDT were substituted for the second application in order to save the beans. Early maturing varieties showed less damage from caterpillar feeding than late maturing ones, since the bean crop had already set before the insect damage occurred.

Cryolite and DDT controlled the caterpillar very satisfactorily on peanuts without any apparent injury to the plants. Sodium fluosilicate-pyrax (1-1) burned the plants severely and reduced the yield of peanuts much below that of the undusted plots. Calcium-lead arsenate and basic copper arsenate were also toxic to peanut plants but less so



TABLE:—A summary of the application rates, relative toxicity, and the resulting yields of beans following one and two applications of various insecticides on soybeans for the control of the velvetbean caterpillar. Baton Rouge, Louisiana, 1944.

Treatment	Rate of application per acre		Worms per 100 sweeps following 1st appli.	Yield of beans per acre			
	1 appli.	2 appli.		1 appli.	2 appli.	1 appli.	2 appli.
	Pounds	Pounds	Number	Bushels	Bushels	Bushels	Bushels
DDT, 3 percent	16.75	16.47	25.25	25.16	24.80	16.37	16.27
Cryolite, synthetic	15.36	15.78	54.50	23.35	23.61	14.56	15.08
Sodium fluosilicate and pyrax (1-1)	15.77	17.66	78.75	17.32	19.14	8.53	10.81
Calcium-lead arsenate	13.27	14.31	116.25	16.84	16.48	8.05	7.95
Basic copper arsenate	13.96	14.66	129.25	15.66	17.60	6.87	9.07
Check, no treatment			144.25	8.79	8.53		
Minimum difference required for significance				3.96	3.96		

than sodium fluosilicate. Since damage from the soybean caterpillar is apparently the greatest hazard to seed production in South Louisiana every effort should be made to control this pest. The cryolite dusting has been recommended for several years now and arrangements should be made for such dusting well in advance of the expected infestation which usually occurs during late summer.

# *Fertilizer and Feedstuffs Laboratory*



## **Activities of the Laboratory . . . A. P. Kerr**

Analyses of commercial fertilizers, feed stuffs and insecticides sold in the State constituted the major portion of the work done in the Laboratory during the past year. The samples were collected and sent to the Laboratory by the State Department of Agriculture. All analyses were reported to the State Department of Agriculture and mailed out from that department. The fertilizer samples represented formulas approved by the War Production Board. All types of insecticides were analyzed, including calcium arsenate, Paris green and lead arsenate. About 1,000 fertilizers, 1,500 feeds and 50 insecticides were analyzed for the State.

The remaining work consisted of more than 500 miscellaneous samples sent or brought to the Laboratory by farmers, business concerns, various branches of the Experiment Station and different departments of the University. Waters, fertilizers, feeds, insecticides and other miscellaneous materials were included in this group. Chemical analysis of water was made for agricultural purposes only. Feed samples represented the farmer's own preparation or commercial mixtures.

Individuals sent specimens of wild plants to the Laboratory requesting analyses. Range cattle live on wild plants and the object of such analyses was to learn the chemical composition which would give an indication as to possible feeding value.

Chemical analyses of cottonseed were made in order to determine their commercial value for manufacturing purposes. In certain sections of the State the free fatty acids in the oil are the controlling factors in determining the value of cottonseed. After the free fatty acids in oil go above 1.80%, the price of cottonseed tends to go down. About 50 such analyses were made last year.

The Laboratory analyzed about 250 samples of liming materials sent in by the Agricultural Adjustment Agency of the Conservation Department. Analyses were made of range forage samples for the Southern Forest Experiment Station. The Dairy Research, Horticulture Research, Poultry Research and Animal Industry Research Departments submitted samples to the Laboratory. These included hays, tung oil nuts, dehydrated sweet potatoes, chicken bones and various

feed ingredients and mixtures. The Laboratory is cooperating with the Department of Botany and Plant Pathology in the investigation of alligator weed. More than 100 poison cases were received by the Laboratory last year. Each year the miscellaneous work varies in character. The number of samples may be one or two in some cases or several hundred in others.



# ***Food Preservation***



C. W. DuBois and Dorothy Colvin

## **Sweet Potato Freezing . . .**

Investigations are under way on processing and freezing of sweet potatoes. Although sweet potatoes may be frozen with some degree of satisfaction, the uses of the frozen potatoes are limited in scope as a result of the processing required. To date only the handling and freezing of pureed sweet potatoes has been worked out satisfactorily.

### **Selection**

Work thus far indicates that freshly dug sweet potatoes do not give a particularly desirable product. Potatoes that have been held for a long period of time are also undesirable. Roots which have been aged in the usual manner for a period of at least six weeks have been found to be superior.

### **Processing Methods**

Sweet potatoes packed as a mashed product or puree require processing so that the potatoes can be frozen successfully.

**Home Preparation.** The sweet potatoes should be washed thoroughly and the ends removed. A large number of fibers are found near the ends of the potato and by removing this portion a better product is obtained. The potatoes are then cooked by boiling them from 30 to 45 minutes depending on the size of the potato. Next the potato skins are removed and the potatoes mashed immediately. This may be done by using a potato ricer or masher.

**Commercial Preparation.** Under commercial conditions mechanical methods simplify the handling of sweet potatoes. They are first washed, then peeled by chemical or mechanical methods. Next they are trimmed and cooked. After cooking they may be run through a puree machine which pulverizes and removes the fibrous material. This must be done while the sweet potatoes are still hot. They should be cooled sufficiently before packaging because of the effect of the heat on the package.

In handling sweet potatoes during processing there is one particular problem that seems important if the processed product is to be acceptable to the public. This problem is that of discoloration or

darkening during handling and preparation. After the sweet potatoes are heated they darken quickly giving them an objectionable appearance. The cause of this darkening is not completely understood. A reduction in pH alone does, however, aid considerably in inhibiting discoloration during processing and storage; therefore, acids aid in inhibiting discoloration. Due to toxicity, effect on flavor, or difficulty in handling, certain acids cannot be used in food materials.

Investigations on the use of discoloration inhibitors have been made only on those inhibitors which would be acceptable in combination with a food. We have found that citric acid, malic acid, aconitic acid, and ascorbic acid (vitamin C) or its isomers and analogues are effective inhibitors. The pH of the Unit I, Porto Rico variety of sweet potato when cooked was 5.9. When the pH was reduced to approximately 5.2, the puree remained a bright golden yellow in frozen storage; thus with the addition of .06 parts of the above acids to 100 parts of pureed potato the product is considered to be acceptable to the public. Ascorbic acid seems most desirable because of its nutritive value and because it does not cause a detectable change in flavor. Because of the lower cost, citric or aconitic acid may be used, but there is a perceptible but not objectionable change in flavor. Other methods of freezing sweet potatoes are being investigated.

### **Okra Freezing . . .**

Okra, when properly selected, prepared, and frozen is a desirable frozen food. Tender, succulent, young pods are best. In the long podded varieties, the pods usually measure from four to six inches in length at this stage of maturity. If the pods can be easily snapped or broken from the plant, they are in most instances tender. This may serve as a good index for selection. Because of its color and generally good quality, Louisiana Green Velvet variety was used in this investigation and found to make an acceptable frozen product.

After the pods are selected, they are washed and the stem end of the pods cut away. Because of the difficulties with the gelatinous exudation, the pods are blanched or scaled in boiling water or live steam in the whole condition. To inactivate the enzymes present in okra it is necessary to blanch the pods two minutes in boiling water or two and one fourth minutes in live steam. Blanching in boiling water seems to be the more satisfactory in the home. Steam blanching is desirable in the commercial plant.

Following blanching the pods are cooled to at least 60°F. if possible. After the okra has cooled sufficiently the choice pods may be sorted out and frozen whole or all may be cut into  $\frac{1}{2}$ " to 1" lengths

and then frozen. It was found that there was less difficulty with the gelatinous exudation when the pods were sliced after blanching.

Next the okra is packaged in a moisture-vapor-proof container. This is important if the quality is to be maintained during storage because okra dries out quickly and loses its quality if packaged in inferior containers. When the okra is packaged it is ready to be frozen. It is important that the pods be placed in the freezer as soon as possible to insure optimum quality. Like other frozen foods okra should be stored at 0°F.

### **Irish Potato Studies . . .**

Investigations now in progress of methods of preparing, freezing, and storing Irish potatoes indicate that they can be successfully frozen for limited uses. In this work we are using potato varieties grown by the U. S. Department of Agriculture, Potato Investigations Division located at Louisiana State University.

### **Variety Studies . . .**

Varieties of strawberries, English peas, snap beans, and okra are being tested for adaptability to freezing preservation. The raw materials are furnished by the Horticulture Department. Because of the need for testing varieties over a period of several years, no recommendations can be made at the present time.

### **Sugar and Product Relationship Studies . . .**

There are conflicting reports in the literature concerning the concentration of sugar and sugar syrup solutions to be added to fruits to be frozen. Recommendations vary from 35 to 70 per cent when sugar syrup is used, or when sugar is used the recommendations vary from one pound of sugar to three pounds of fruit, to one pound of sugar to six pounds of fruit.

When syrups are too highly concentrated they do not freeze solidly under ordinary conditions and a soft pack is obtained which may result in a package leakage problem. Highly concentrated solutions do however preserve texture, color and flavor in the frozen fruit. Packages of fruit which contain syrups of too low a concentration are of poorer flavor and texture, and color changes are more likely to occur.

No data are at present available which show what the freezing points of the various sugar solutions are after they have been added to the fruit and osmosis has taken place. The addition of this information would show exactly what concentration of sugar and sugar syrup solutions give soft packs under ordinary frozen storage condi-

tions and will aid in further investigation of the problem. This and other investigations are now in progress.

### **Effect of Salt (sodium chloride) on Quality of Frozen Vegetables . . .**

Vegetables may be frozen with or without a sodium chloride solution. When vegetables are packed with sodium chloride, a 2% solution is generally recommended. The advantages of such a pack as cited in the literature are: (a) prevents drying of the vegetable product while in frozen storage; and (b) prevents spoilage by bacterial action. The disadvantages of a brine pack are: (a) takes a longer period of time to defrost; (b) requires more time in preparation for freezing; and (c) may bring about chemical changes during storage.

There is some question as to the effects of salt on bacterial growth and on chemical changes in products during storage. This department has set up a project which is now in progress to obtain this information.

### **Discoloration Studies . . .**

Previously published results (DuBois and Tressler, 1944) in work done elsewhere revealed that ascorbic acid may be used to inhibit the discoloration of cut fruits and vegetables. It has widespread practical advantages particularly in frozen products. In an effort to determine the effects that various methods of handling might have on the retention of ascorbic acid added to products before freezing an experimental project on peaches was set up to investigate the problems further. This project will not be completed until the frozen product has been in storage for twelve months. Preliminary results indicate that handling methods have an effect on the retention of the discoloration inhibitor and the amount required to be effective while the product is in storage.

### **Shrimp Investigations . . .**

Shrimp stands among the leaders of seafoods in money value and tonnage produced in the United States. The United States Bureau of Fisheries and the Louisiana Conservation Department estimates show that sixty to seventy per cent of the shrimp produced in the United States come from Louisiana Gulf Coast waters. This approximates 85 million pounds valued at \$3,000,000. There are problems connected with spoilage and in maintaining high quality in the fresh shrimp. The losses in some years are often as high as ten per cent of the total catch.

Studies of the causes of the losses of the annual shrimp catch are being made aboard boat in the shrimping waters in order to obtain fresh samples and work with them under controlled conditions. We are indebted to Mr. G. C. Lewis of Westwego for providing space aboard one of his shrimping vessels for a field laboratory.



Freezing preservation is a means of reducing some of the losses and improving the general quality of shrimp shipped to remote markets. However, there are certain factors of handling prior to freezing that require study to insure a high quality frozen product. It is necessary to determine the best way of preparing shrimp for freezing so that the quality may be maintained for many months in freezing storage.

The present procedure generally followed requires that shrimp be glazed or coated with a film of ice so that the shrimp retains its quality. This is costly in time and in added weight which in many cases increases the transportation costs to remote markets. Possible improved methods of packaging and packaging materials are being investigated.

# Forestry



Forestry research work has been very limited since the war began due to limited faculty personnel. However, several projects are active and the field work in three states has been completed, and the data collected are being prepared for a final report. The following is a short abstract of a portion of this work already published by A. D. Folweiler in La. Bul. 377, under the title of "Forest Land Ownership in Louisiana and its Influence on Timber Production."

Title to the forest land of Louisiana is held mostly by private owners. The public owns approximately twelve per cent. This means, therefore, that the task of increasing the fund of timber in Louisiana, available for use by the forest products industries, is intimately bound up with private ownership. The number of private holdings is very large. These owners, moreover, are a heterogeneous lot from the standpoint of purpose in retaining title to their forest land holdings.

Louisiana contains forest land that can be grouped into three important forest types. These types are: (a) the loblolly-shortleaf of Northwest Louisiana, (b) the longleaf and longleaf-slash type of the Southwest and the Southeast, and (c) the bottomland hardwoods.

In the loblolly-shortleaf area, there are approximately three thousand feet board measure of sawlogs, or thirteen cords of pulpwood on the average acre. In contrast to this, in the longleaf-slash type, there are one thousand feet board measure of sawlogs, or three cords of pulpwood. This condition is the result of the ability, or lack of it, of each forest type to establish young stands of timber. In turn, this is reflected in the ownership of the land. In the loblolly-shortleaf type, 40 percent of the forest land is owned by forest products industries that operate manufacturing units dependent upon the timber on their own and adjacent lands. Farmers, or private owners who hold title to farm units, account for 39 percent of the forest land ownership. In the longleaf-slash type, on the other hand, the owners of farm units hold title to only 11 percent of the forest land. The forest products industries own 25 percent, and the miscellaneous owners, which include the forest products industries that have liquidated their timber holdings and dismantled their mills, hold title to the remaining 64 percent, or almost two-thirds of all the forest land.

Insofar as the pine types of the State are concerned, the forest products industries have much more incentive to hold forest land in the loblolly-shortleaf type than in the longleaf-slash. The first-mentioned type is much more readily managed for continuous timber production than the latter.

In the bottomland hardwood type, even in the most productive area, viz., the Delta or Northeast Louisiana, the fund of timber is only three thousand feet board measure of sawlogs on the average acre, or eleven cords of pulpwood. Of the pulpwood, less than half of the volume is currently utilizable by pulp mills because of the pulping characteristics of some of the species. In the Delta area, the forest products industries own only about one-quarter of the forest land. Almost half of the forest land is attached to agricultural units. Miscellaneous owners hold title to the remaining one-quarter of the forest land area.

In the nine parishes that were studied intensively for ownership, there were almost 16,000 owners who held title to slightly more than 3,000,000 acres of forest land. For a given unit of forest land, owners are most abundant in the loblolly-shortleaf type and least numerous in the bottomland hardwood area.

Because of the relative ease with which forestry can be practiced in the loblolly-shortleaf area, which is about twice the size of the longleaf-slash type, most attention has been devoted to it in this inquiry. In 1943, the forest land of the loblolly-shortleaf area was producing at less than half of its capacity.

The practice of forestry in the longleaf-slash type is more difficult than in the loblolly-shortleaf. This is caused by the characteristics of the species. The ownership pattern that currently exists is, in-part, a reflection of the peculiarities of the forest type. Cutover forest land reseeds reluctantly. Because of the long-time nature of the enterprise, the owners have very little incentive to invest money in timber production. If the area covered by the longleaf-slash type is again to become highly productive of timber, there must be planting of tree seedlings done on an extensive basis. This will call for an investment of capital on more than a million acres.

Just as Louisiana has had some of the finest stands of longleaf pine in the South, so has it had high-quality forests of hardwood timber, particularly red gum and cypress. The hardwood forests, however, have been well culled over. The quality of the timber now present is considerably inferior to what once existed. The nub of the task of increasing the fund of timber in the hardwood belt is the utilization of the low-grade species and low-value trees that dominate so much of the area. The bottomland hardwood type accounts for almost half of the forest area of the State, but very little is known of forest management for it. Much needs to be done to determine economic uses of the low value species that occupy so much of the bottomland hardwood area.

# *Home Economics*



## **Nutrition Education Research . . . Floy Eugenia Whitehead**

A project in nutrition education research was initiated October 1, 1944 under the direction of the Department of Home Economics. This work, which is tentatively planned for a period of two years, is made possible by a grant from the General Education Board and is being conducted in Ascension Parish.

The investigation purports to discover effective ways of teaching nutrition. It is based on the assumption that the effectiveness of teaching nutrition will manifest itself not only in measurable changes of physical growth but also in measurable changes of behavior patterns.

A major part of the first year's work is that of appraising the nutritional status of children in Ascension Parish and evaluating teaching methods used in classes concerned with nutrition education. The investigator, in cooperation with public school administrators and teachers, is making studies which consider problems concerned with (1) food habits of school children and teachers, (2) attitudes about foods which are reflected in children's conversation, (3) conditions of children's teeth, (4) growth in weight and height of school children, and (5) evaluation of selected methods of teaching nutrition.

The data collected regarding the studies mentioned should provide evidence upon which to base the second year's work. The major part of the second year's work will be that of testing teaching methods in selected groups. This part of the project will be limited to the selection of two groups of children as nearly alike as possible, one of which will be the control group and the other will be the experimental group.

Beginning December 6, 1944, children and teachers, both white and negro, kept records of foods eaten over a period of seven consecutive days. Such records are being analyzed to determine (1) judgment ratings of "good", "fair", and "poor", (2) common meal patterns, and (3) dietary trends of adequacy and deficiency.

Data are being collected on each of the studies mentioned.



# Horticultural Research



## Introduction

Even though several members of the staff are now in the armed services and there is a shortage of labor, none of the major projects has been discontinued as a result of the war. More emphasis has been placed on the application of research problems under way, and less time devoted to fundamental problems. In doing so members of the staff have supervised and conducted research work on dehydrated food crops, sweet potatoes and onions, and have aided materially in the production of these and other food crops for the armed forces.

## Sweet Potato Breeding . . . Julian C. Miller

Each year around 5,000 seedlings are grown and tested. The more promising ones are grown for increase and further study. A group of five seedlings, together with Porto Rico Unit I, were selected to study the ascorbic acid and carotene contents in the fresh state. One of these seedlings, L 126 (as shown in Table 1), is now being grown for increase. It is the highest in ascorbic acid and is also high in carotene.

TABLE 1. ASCORBIC ACID AND VITAMIN A CONTENT OF PROMISING SEEDLINGS.\*

Variety	Ascorbic acid		Vitamin A
	Fresh —	Mgms. per 100 grams Sampled day after harvesting, October 1944.	I.U./100 gm.
Port Rico, Unit I		29.5	13,750
L 12		23.3	17,190
L 64		21.1	15,500
L 126		32.5	17,500
L 156		30.5	19,450

As rapidly as seed stocks of these better seedlings can be increased they will be made available to the growers. The L 126 and L 156 have proved to be superior seedlings for processing, either dehydration or canning. Both show less oxidation or darkening than the standard Porto Rico Unit I or other seedlings tested.

## Sweet Potatoes for Table Use . . . W. D. Kimbrough

There is considerable interest at the present time in new table stock sweet potato seedlings. A few have been grown to a limited

\*The above analytical work was conducted by staff members of the Nutritional Laboratory.

extent commercially. Because of the interest it is thought advisable to give some data that have been obtained during the last three years. The potatoes were grown on Lintonia silt loam on the Experiment Station farm at Baton Rouge.

YIELDS AND MOISTURE CONTENTS OF TABLE STOCK SWEET POTATOES

(3 yr. ave. 1942-44)							
Variety or seedling	Date of planting	Date of digging	Jumbo	Bushels per acre			Moisture per cent
				No. 1	No. 2	No. 3	
L - 126 (Queen Mary)	May	October	8.6	247.3	43.9	19.2	73.35
L - 9	May	October	5.1	274.5	28.1	8.6	72.34
Porto Rico (Unit I)	May	October	23.7	344.7	30.5	17.8	70.07
L - 12 (Ranger)	May	October	33.1	271.8	15.6	5.6	73.69
L - 126	June	October	0.9	179.2	31.1	21.6	72.85
L - 9	June	October	0.0	195.4	25.9	8.0	73.36
Porto Rico	June	October	0.0	211.6	26.2	17.3	69.25
L - 12*	June	October	2.9	263.9	13.8	5.8	72.80

The L-126 has been named the Queen Mary and the L-12 the Ranger. The L-9 at first seemed to be a very promising seedling, but it proved to be so likely to crack badly that it has been discarded. The data show the Unit I Porto Rico, our standard, produced higher yields than any of the three seedlings. This was especially true when the potatoes were planted early. This is important when potatoes are produced for dehydration purposes. The three seedlings were also higher in moisture content and this means they are lower in food value and may not keep as well in storage. The three seedling potatoes all had better interior color than potatoes of the standard Porto Rico Unit I variety. This means that they contained more carotene or provitamin A.

## Fertilizer for Orange Trees . . . W. D. Kimbrough

Very little work has been done concerning the fertilizer needs of orange trees in groves of southern Louisiana. Last year an experiment was started in the Magnolia Grove in Plaquemines Parish. Trees, about 17 years old, in plots receiving 15 and 20 pounds of 5-10-5 fertilizer in late winter made better growth and seemed in better condition than those that received smaller applications. Manganese deficiency symptoms were present on trees which made good growth and had not received manganese in spray form. The symptoms were more evident early in the season and tended to fade out later. Manganese applied

\*Two year average 1942-43

to the soil with the fertilizer did not prevent deficiency symptoms. This is probably explained by the fact that the relatively high pH of soil caused the manganese to be unavailable to the trees. No zinc deficiency symptoms were found in the experimental plots, though they have been found on trees in groves in southern Louisiana.

## **Study of Some Genetic Characters of the Sweet Potato**

. . . Morris B. Hughes

Perhaps the most important problem in sweet potato breeding is how to combine the Fusarium wilt resistance possessed by certain starch varieties (notably L 4-5) with the edibility and carotene of certain table varieties. This task would be much simplified if the hereditary basis of wilt resistance and of carotene was understood.

Crosses were made in late 1942 between L 4-5 (the highly resistant starch potato) and both white and carotene-fleshed susceptible varieties. Due to the sparse blooming habit of the former only a few  $F_1$  seedlings were available in 1943.

Some of these arose from a cross with 98 (Unit I Porto Rico x Triumph) x Mameyita, a heavy blooming wilt-susceptible, white-fleshed seedling. These seedlings were the only ones with a pronounced tendency to bloom and from one of them was derived  $F_2$  and backcross seed. Two wilt tests were run in 1944 on the  $F_1$ ,  $F_2$  and backcross seedlings with the cooperation of Dr. T. T. Ayers of the U. S. Department of Agriculture.

The tests were not conclusive. In the November test, involving the  $F_2$  and backcross seedlings, even L 4-5, which is considered practically field-immune showed vascular discoloration in 8 of the 12 plants tested. None of the  $F_2$  or backcross seedlings showed the expected high resistance. It may well be that the conditions, as shown by L 4-5's reaction, were so severe as to preclude the showing up of various degrees of resistance.

Certain  $F_1$ 's between L 4-5 and susceptible parents showed considerable resistance and a high per cent of resistant seedlings came out from the cross of 47442 (wilt-resistant) x L 4-5 (wilt-resistant).

In brief, it appears that resistant x resistant gives a high per cent of resistant seedlings, resistant x susceptible gives an occasional resistant seedling while the  $F_2$  and backcross behavior of resistant x susceptible suggests that resistance is recessive, is conditioned by more than one gene and that the gene action is somewhat complicated.

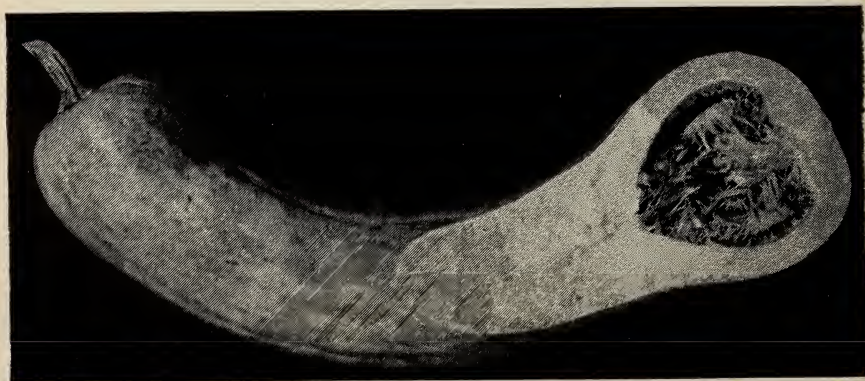
A standard set of conditions needs to be set up under which all wilt tests are run so that tests at different times can be better com-

pared. Large progenies and repeated testings will be necessary before the inheritance of wilt resistance is well understood.

An  $F_2$  between carotene-fleshed and white-fleshed potatoes has not yet been grown but will be in this coming season. Since it is expected to consist of 400-500 individuals a sufficiently indicative ratio should be available to allow a preliminary theory on flesh color inheritance.

## The Longfellow Pumpkin . . . Julian C. Miller

Realizing that there is a definite place for a good quality pumpkin in the southern diet, and a definite season of the year when this crop could be used to an advantage, an experiment was set up to breed an improved variety of pumpkin. The southern cushaw (*C. moschata*) has been used to a great extent in the past to fill this need. Realizing, however, that the cushaw has its disadvantages as well as its advantages, an improvement over the cushaw was sought. To bring about this improvement, in 1940 the writer crossed the cushaw with the African squash, which in reality is a pumpkin, (*C. pepo*), the latter being smaller but richer in color and freer from fiber than the cushaw. It is also highly resistant to injury from insects, particularly the squash borer. Selections have been made from this cross and for a number of years these have been selected for certain characteristics such as a long neck (12 to 18 inches long and about 4 inches in diameter) with a reasonably small seed cavity (5½ to 6 inches in diameter). See photograph. This selection is far superior to the old type cushaw and is also superior to the African squash in vigor and adaptability. Two crops a year can easily be grown from this pumpkin, a spring crop and a fall crop. This pumpkin will store well throughout the summer as well as



Longfellow pumpkin. Cut section showing solidity of neck and small seed cavity. The neck is solid and possesses a very rich yellow color.



during the fall and winter. During the winter the pumpkin should be stored in a warm room similar to that used for sweet potatoes.

**Use.** The Longfellow pumpkin might be used as a summer squash, that is, using it when it is very small and tender (4 to 5 inches long). Again after they have fully matured and turned yellow they may be prepared by boiling, making pies, or candying. Canning and quick freezing tests have demonstrated its suitability for these purposes. A number of Louisiana canners plan to use it on a small scale in their commercial operations next year.

This pumpkin matures the latter part of June when the spring vegetables throughout the lower South are about gone and before many of the summer vegetables have reached their peak. Therefore, it fills a gap in the food supply, particularly of the yellow pigmented vegetables. It can be used from the latter part of June and throughout July until the sweet potato crop begins to appear on the market. It possesses 2562 International Units of vitamin A per 100 gram sample which is about one-half the vitamin content of the standard varieties of sweet potatoes.

There have been only four generations of selections of this pumpkin and it is still showing some segregations, and will probably do so for at least 10 generations. However, the majority of fruits are reasonably uniform in shape and due to its superior quality over the cushaw it is felt that it should be released in a limited way this year. Inbreeding and selection will be continued for the type illustrated in Fig. 1.

The Experiment Station has turned a small quantity of seed over to Mr. G. L. Tiebout of the Agricultural Extension Division for distribution to Victory Gardeners. However, large quantities of seed will not be available until next season—1946.

## **The Louisiana Allyear Cabbage . . . Julian C. Miller**

This is the second variety of cabbage to be introduced by the Louisiana Agricultural Experiment Station. The first one, Louisiana Copenhagen, was introduced in 1934. Methods used in breeding the Louisiana Copenhagen, as described in Bulletin No. 260, were used for the Louisiana Allyear.

The commercial growers of the State wanted a larger, more round-headed cabbage, which would stand higher temperatures at planting time during July and August, and also which was more winter hardy than the Louisiana Copenhagen or similar strains. It was with these objects in view that the Louisiana Allyear was bred. In order to maintain the quality of the Louisiana Copenhagen and at the same time

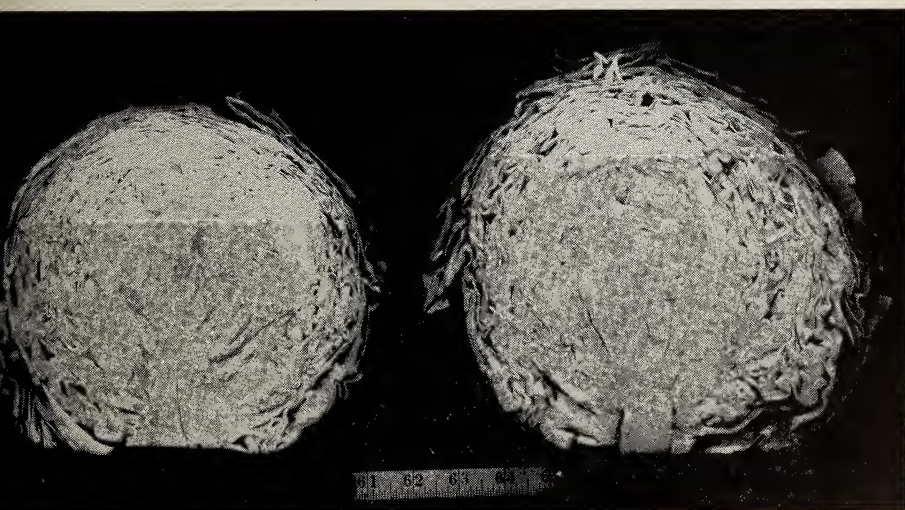




instill some yellows resistance of the Marion Market into a new type, in 1935, the Louisiana Copenhagen was crossed with the Marion Market. In 1936 this F<sub>1</sub> was crossed to the Charleston Wakefield which has regional adaptability and resistance to heat and cold. A large seedling population was grown and a number of more promising selections were made. After the second year of testing the larger population was reduced to one particular selection which exhibited the hardness and



Trimmed heads for market. Note outer leaf covers greater portion of head.



Cross section of two heads displaying character of leaf fold and shortness of core.

plant sought for. Since 1938 efforts have been made to purify the present strain, selecting for the vigorous plant characters of the Charleston Wakefield but having round Copenhagen head type. The interior of the head is very compact and has a short core (see photographs). When crossing different varieties, the tendency is for the core to elongate and it takes a number of generations of inbreeding and selection to shorten the core. Since 1938 that has been the principal object in our breeding program—purifying the strain for round, compact heads with a short core.

Heads of the present selection are medium in size, weighing  $3\frac{1}{2}$  to 4 pounds in the fall and slightly less during the winter months. Heads produced from the spring crop are not quite as large as those produced during November and December. The spring crop, however, produced very compact heads which will stand unusually high temperatures. Cabbage has been harvested from this variety at the Louisiana Agricultural Experiment Station as late as July 15.

Seed of the Louisiana Allyear is now being increased by a number of seed companies specializing in cabbage seed production and is available to local seedsmen.



# ***Plant Pathology***



## **Annual Report of Progress on the Hot Water Treatment of Sugarcane . . . P. H. Dunckelman and C. W. Edgerton**

Investigations to determine the effects of treating seed cane with hot water at 52° C. for a period of 20 minutes were continued through 1944. Eight plantations, representing various sections of the Louisiana sugarcane growing area, cooperated in this research. Replicated plantings, using two varieties of cane, one of which was C.P. 29/320, were made at different dates at each place. The stimulating influence on germination, stands, growth, and yields has been observed. The incidence of root rot disease of sugarcane is apparently lessened by a more rapid and extensive development of the root system.

The results obtained in 1944 were remarkably similar to those of preceding years. In both first year stubble and plant cane of the variety C.P. 29/320, higher yields were obtained in the treated plots. In the plant cane of the variety C.P. 29/320 the treated plots showed increases over the non-treated of 2.14 T. in the August, 3.68 T. in the September, 5.40 T. in the October, and 3.61 T. in the November plantings. Temperatures of 50° to 52° C. have been found most satisfactory for treating the seed cane.

## **The Place of Plant Pathology Research in the Sugarcane Variety Program . . . I. L. Forbes and P. J. Mills**

Diseases have played a major role in the several failures that have occurred in the Louisiana sugar industry during the past years. The major diseases have been red rot, root rot, and mosaic. During the last twenty years varieties have been changed several times. In the development and testing of new varieties only those that show commercial resistance are considered for release to the Sugar Industry. This testing requires tedious inoculation work with the red rot and the mosaic diseases. Not only are the seedlings tested for resistance to the diseases but several years of yield data are required to determine how a variety will compare with standard commercial canes. At the

present time there are twelve commercial varieties being grown in the State. Of these, only two, Co. 281 and Co. 290, are highly susceptible to mosaic. C.P. 28/19 and C.P. 23/11 are classed as commercially resistant, although in certain areas infection of C.P. 28/11 has been rather high. C.P. 33/243 is susceptible to a severe yellow mosaic, but this disease has been controlled in commercial plantings of this variety by roguing out diseased plants in seed plots and using only mosaic-free cane for seed. The remaining commercial varieties, C.P. 29/320, 29/116, 29/103, 29/120, 33/425, and 33/310 are either immune or highly resistant to mosaic. Through our systematic testing of new seedlings, we hope to prevent any variety from being released in the future if it is susceptible to mosaic. If this can be done, within a period of a few years mosaic should become of minor importance in the Louisiana Sugar Industry because of the fact that the susceptible varieties will have been gradually replaced by resistant ones.

Red rot is of major importance in Louisiana today in reducing stands in susceptible varieties. Here again, susceptible varieties such as Co. 290, C.P. 28/19, and C.P. 33/243 are gradually giving way to more resistant varieties in certain soil types and under conditions of poor farming which make for greater damage from red rot.

The inoculation tests with all commercial varieties as well as new promising seedlings must go on year after year in order to keep a close check on the relative resistance and susceptibility of the various varieties. By such a method of testing we are able to predict with at least a fair degree of accuracy when a variety is beginning to fail in a particular area. As a result of such research on sugarcane diseases we now have a number of exceptionally good varieties in commercial production in the State and others, properly tested and practically as good, that are available for seed increase in the event a particular commercial variety should fail and have to be replaced in short order. But the testing must go on continuously in order that we may be able to keep ahead of the game from the standpoint of sugarcane disease control in Louisiana.

## **Bordeaux Mixture Reduces Damage from Stalk Rot of Seed Onions . . . E. C. Tims**

The growing of Creole onion seed in Louisiana is limited by a dying of the seed stalks about the time that blooming and setting of seed begin. Some of the dying of seed stalks is due to root disease, including pink root. Other factors also enter into the disease complex, but the most serious trouble is caused by stalk rotting fungi. **Purple blotch** (*Macrosporium* (*Alternaria*) *porri*) is one of the well-known



Pink root of shallots

stalk diseases of onion. It apparently causes only slight damages here in normal times. The "black stalk" infection, associated with *M. parasiticum* (*Alternaria parasitica*), causes a rapid blackening and killing of the seed stalks in periods of wet weather. Mildew (*Peronospora destructor*) may also cause serious damage to onion seed stalks.

In 1944 preliminary spray tests were made to control rotting of onion seed stalks. Fermate and Spergon at the rate of 1½ pounds per 100 gallons of water, and Bordeaux mixture 4-4-50 were applied at weekly intervals, beginning early in March and extending up into May.

Good coverage of the seed stalks was obtained by the use of a spreader-sticker which included rosin-soap and a DuPont spreader. The stalk rotting began early in April and became quite severe during a period of wet weather that continued for about two weeks. Conditions were ideal for testing the efficiency of the spray materials. Fermate and Spergon failed to reduce stalk rotting to any appreciable





Onion stalk rot

extent, but the Bordeaux mixture reduced the amount of disease consistently throughout the test. Complete control was not obtained but the Bordeaux mixture gave promising results in the first year's test.

## Studies on the Alligator Weed . . . Clair A. Brown

The Alligaor weed (*Alternanthera philoxeroides*) has in recent years become a serious pest in certain sections of South Louisiana. Besides clogging up the canals and drainage ditches, it is now covering many cultivated fields. In certain sections of the sugar belt and in some areas of the trucking district in the Florida parishes, it has become the most serious of the weed pests.

At the last session of the State Legislature, an appropriation was made to study the pest and to try out various control measures. It has been found that any portion of a stem or root left in the ground will produce a new plant. This means that the cutting up of the roots and stems by cultivation helps to propagate the plant.

At present, most of the weed killers on the market, as well as various chemicals which might be important, are being tried out to determine if they might have value in exterminating the pest. Some of these have killed the parts of the plant above ground but none of them has penetrated satisfactorily down into the root system.





Roots of alligator weed showing new plants developing from each piece.

A study is at present being made of the structure and physiology of the plant. The study is being made in cooperation with the Department of Botany of the College of Arts & Sciences.

## Arborvitae Blight Controlled by Spraying . . . A. G. Plakidas

The oriental arborvitae has been considered a very important evergreen ornamental and in the last decade has been very widely planted in the southern states. A disease, however, known as the blight, has been very troublesome and is at present restricting its use. In recent years the removal of diseased trees has been a common practice and in new plantings other species are being used.

This disease attacks the small twigs and causes the foliage to turn brown and die. The disease often becomes so severe that large branches or even the entire tree die. Besides injuring trees in yards and parks, it has also become a serious nursery pest. In some instances, nurserymen have had to discard whole blocks of young trees on account of the disease.

For some years after the disease was known, little attention was paid to the cause. From time to time it was attributed to red spiders, winter injury, or high summer temperatures. When investigated, however, about two years ago, the disease was found to be caused by a



Arborvitae blight. Plant in center healthy, others affected.

fungus which up to that time had not been described. The fungus has since been described and named *Cercospora thujina*.

When the nature of the parasite was known, control by spraying seemed possible. During the past two years a number of fungicides have been used in spraying tests. Almost perfect control has been secured with Bordeaux mixture (4-4-50) and with Cuprocide (3 pounds per hundred gallons of water). Best results have been obtained when the sprays were applied at monthly intervals from June to September. Sprayed blocks in nurseries have gone through the summer season in a perfect condition.

## **D-D Treatment for Control of Nematodes and Certain Weeds . . . S. J. P. Chilton and L. H. Person**

The obtaining of a satisfactory control measure for nematodes in the south is one of the major pathological problems with certain crops. Recently a new compound D-D (not D-D-T) has been put on the mar-





Treating soil for nematodes. Tomato plants on left set in soil treated with DD. Plants on right in untreated soil.

ket and its cost seemed low enough to justify tests under Louisiana conditions. Replicated plots were treated July 22, 1944, by punching holes 5 to 6 inches deep in the soil, and into each hole pouring various amounts of D-D from 5 to 25 cc. The holes were immediately closed and tomato seed were planted on August 4 and 8. When the plants were examined three months later the roots of plants in the untreated soil were very heavily infected with nematodes showing very large galls. The treated plots, with all dosages, excepting three plants out of a total of several hundred, were free of nematodes. The roots of these three plants were slightly infected at the tip. These root tips were probably outside the effective range of the material. The D-D was effective for a radius of 6 inches around each point of application.

The soil in which the test was made was also heavily infested with alligator weed. No alligator weed grew in a radius of 6 inches of the points of application of the D-D. Other plants such as Amaranthus, coco, and Bermuda grass were also materially reduced in amount. Another test using 5 cc. of D-D every 10 inches apart in holes 5 to 6 inches deep was made on August 12 and gave practically complete control of the alligator weed and again greatly reduced the other weeds.

This material, if future tests give similar results, may be of value in controlling losses by nematodes in valuable horticultural crops,

particularly those planted in hills. It may also be of value in the control of certain weeds if the cost of treatment can be reduced to a reasonable figure.

## Seed Treatment of Rice . . . S. J. P. Chilton

Tests to determine the effect of seed treatment on stands and yields of rice were continued in 1944. In three dates of planting, Arasan gave the best results, increasing the stands of Early Prolific 23%, Blue Rose 30%, Rexoro 26%, and Fortuna 10%, while relatively small increases occurred with Spergon and New Improved Semesan Jr. Increases in yield with Arasan were .77 barrels per acre with Early Prolific, 1.65 barrels with Blue Rose, 2.7 barrels with Rexoro, and .55 barrels with Fortuna. No increases occurred with Spergon and New Improved Semesan Jr.

These results if confirmed by further tests indicate that seed treatment may be of value with rice.

## Disease Resistance in Rice . . . S. J. P. Chilton

In cooperation with the U. S. D. A. plant breeder at Crowley, La., a large number of varieties and hybrids are tested each year for their resistance to the *Cercospora* leaf spot disease of rice. Resistance to white tip is also noted. One early variety being increased for release under the name Magnolia is resistant to races 1, 2, 3, 4 of *Cercospora oryzae*. It also has some resistance to white tip. Another medium early selection from a cross between Iola and Blue Rose is also resistant to races 1, 2, 3, 4 and has the added advantage of being very resistant to white tip.

## A New Race of *Cercospora Oryzae* . . . S. J. P. Chilton

Rexoro, a variety of rice which has in the past been resistant to all known races of *Cercospora oryzae*, the organism causing the *Cercospora* leaf spot, was found to be severely spotted at the Crowley Experiment Station in 1944. Apparently a new race of the fungus has appeared to which Rexoro is susceptible and this may necessitate selection for resistance to this new strain.

## Oat Seed Treatment . . . S. J. P. Chilton

Considerable difficulty is often experienced in obtaining satisfactory stands of oats in the rice area. A preliminary test in which Arasan was used as a seed treatment gave an increase in stand of 44 per cent over untreated seed. The test seems striking enough to justify further studies.



# Sulphur and the Control of Soil Rot of Sweet Potatoes

. . . L. H. Person

In St. Landry and St. Martin parishes, which grow sweet potatoes for shipment, soil rot has been causing relatively large losses particularly in seasons with low rainfall in May and June. Among the control measures tested, the use of sulphur as a soil amendment has seemed promising.

The addition of 500 to 700 pounds of sulphur per acre to the soil in the fall of the year preceding the one in which the sweet potatoes were planted has given good control of the disease and has made it possible to produce a satisfactory crop in fields heavily infested with the organism causing the disease. The sulphur treatment has been effective for four years without further additional applications of sulphur. The sulphur lowers the pH of the soil and this should be taken into consideration when plants other than sweet potatoes are to be planted in the treated fields. In general, crops other than sweet potatoes should not be planted on treated soil during the first year following the treatment.

## Peanut Seed Treatment . . . L. H. Person and S. J. P. Chilton

Seed treatment studies with peanuts were continued in 1944. Six dusts, Arasan, Spergon, 2% Ceresan, Barbak-C, copper aconitate, and



Peanut leaf spot

a new compound of the U. S. Rubber Co., No. 604, were tested. Two plantings, May 29 and June 5, were made at Baton Rouge. Stand counts given in the following table show that No. 604, Arasan, and Spergon gave large increases in stand, while 2% Ceresan and copper aconitate at the strengths used were toxic, reducing stands below that of the untreated seed.

Date Planted	STAND IN PER CENT						Copper Aconitate
	Untreated	US 604	Arasan	Spergon	Barbak C	2% Ceresan	
May 29, 1944	50.9	79.6	78.6	75.3	—	46.3	45.8
June 5, 1944	55.1	80.6	79.5	77.4	66.2	42.4	—
Average	53.0	80.1	79.1	76.4	66.2	44.4	45.8

## Sweet Corn Seed Treatment . . . L. H. Person and S. J. P. Chilton

In the past four years seed treatment tests have been made with sweet corn using some of the commercial fungicidal dusts recommended for corn seed treatment. Barbak C, New Improved Semesan Jr., Spergon, and Arasan were tried. Spergon and Arasan gave the best results with 25.9 per cent and 25.2 per cent increases in stand over untreated seed. New Improved Semesan Jr. and Barbak C gave 8.2 per cent and 13.3 per cent increases in stand over the untreated seed. Either Arasan or Spergon would seem to be of some value in improving the stands of sweet corn, at least in early plantings.

## Treating Sweet Potatoes to Control Black Rot . . . L. H. Person

In the last two years black rot of sweet potatoes has increased in the commercial shipping areas and losses have often been serious in stored potatoes and in potatoes washed prior to shipment. While it is recognized that the only practical control measures for this disease are the use of disease-free potatoes for planting purposes combined with a satisfactory rotation, the spread of the disease can be checked somewhat by treating the potatoes before planting with a suitable fungicide.

The standard fungicide for treating seed potatoes for black rot has been for many years a solution of corrosive sublimate. Because of the scarcity of this material and its present high cost, attempts have been made to substitute other compounds. Borax at various concentrations has been tried and has given the best results over a three-

year period. One pound of borax to 10 gallons of water has given the best results. Larger amounts of borax have been toxic and have injured the slips. Best results have been secured by soaking the potatoes in the borax solution for 8 to 10 minutes immediately before planting.

## **Black Scale of Easter Lily . . . A. G. Plakidas and F. J. LeBeau**

The disease of Easter lily known as the Black Scale is at present becoming a serious threat to a developing industry. The disease was first recognized in Plaquemines Parish in the 30's and apparently from there spread to other localities along the Gulf Coast. In Terrebonne Parish, where an attempt is being made to establish a lily-growing industry, it has appeared in a number of important plantings. For such an industry to become successful the disease must be eradicated or controlled. At present, in an attempt to check the spread of the disease, measures to prevent the planting of diseased bulbs are being used. A system of certification has been adopted and only bulb lots which are free of the disease are available for commercial fields. Such measures may temporarily check the spread of the disease. The final solution of the problem must, however, depend on more efficient methods of control. At present, various control measures are being investigated in the hope that some will be found of value.

## **Control of Downy Mildew of Cucumber . . . F. J. LeBeau**

In previous work already reported the necessity for spraying or dusting fall-grown cucumbers in the Hammond area has been demonstrated. It has also been brought out that dusting with a suitable fungicide and insecticide preparation is superior to spraying with Bordeaux mixture since the dust preparations give as good control of the disease without the injury to the crop which attends spraying with Bordeaux.

The continuation of this work has been directed at determining to what extent the dust formulae may be modified to reduce the cost and whether a spray substitute for Bordeaux mixture could be found.

The 1944 season proved to be a good year for mildew development, therefore good comparative results were obtained. These may be summarized as follows:

1. The tribasic copper sulphate content of the blue dust which was used by the growers could be reduced from 12% to 8% without reducing its effectiveness in controlling mildew.



2. The red dust containing 5% yellow cuprocide gave good disease control but it injured the foliage to some extent.

3. The fermate dust containing 10% fermate was effective in controlling mildew and caused no injury to the vines.

4. Cryolite to the extent of 20% of the dust was as effective in worm control as when 33% was used.

5. Tribasic copper sulphate spray was not sufficiently effective in controlling the disease to warrant its substitution for Bordeaux.



Cucumber mildew

## Strawberry Leaf Blight Control . . . F. J. LeBeau

Work, previously reported, on the comparison of various proprietary copper compounds and various dusts with Bordeaux mixture for the control of the leaf blights has been continued. The 1944 tests confirmed earlier ones in showing that a tribasic copper sulphate spray may be successfully substituted for Bordeaux mixture. The combination dust which contains copper for controlling the diseases and sulphur for controlling red spider gave excellent disease control. The red spider infestation in 1944, however, was inconsequential and therefore information on the control of this pest was not obtained.



## Fertilizers and Root Rot of Rice . . . S. J. P. Chilton

Experiments in the past years have shown that the application of 400 pounds per acre of a 10-10-0 fertilizer to rice in root rot areas has resulted in rather large increases in yield over untreated areas. The procedure in applying the fertilizer was to drain the field in June or July, apply the fertilizer on the soil, and then reflood. This involves draining the water over the whole field since root rot areas are usually scattered throughout the field. If fertilizer could profitably be applied on healthy areas as well as root rot areas it would simplify treatment of diseased areas and compensate for the expense of draining the fields. It also seemed desirable to determine if the use of a smaller quantity of the fertilizer might be more profitable and whether both nitrogen and phosphorus were necessary in the fertilizer.

In 1944 the tests included, in addition to the 400-pound application, a 200-pound per acre application of the 10-10-0 fertilizer, a 200-pound per acre application of 20% ammonium sulphate, and a 200-pound per acre application of acid phosphate. The fields were drained in June or July and the fertilizer was applied to the soil after which the fields were reflooded. Tests were made both in root rot areas and in healthy areas.

In seven tests in which 400 pounds per acre of the 10-10-0 fertilizer was applied an average increase of 5.3 barrels of rice was obtained. In two of the tests on root rot areas the increase was 6.0 barrels per acre, and in 5 tests where no root rot was visible the increase was 5 barrels per acre. In five tests in which 200 pounds per acre of the 10-10-0 fertilizer was used, an average increase of 2.9 barrels per acre was obtained. In one test on a root rot area the increase was 3.1 barrels per acre, and in four tests on areas free of visible root rot the increase was 2.8 barrels per acre.

In these tests, at present rice prices, the net value of the rice over the cost of the fertilizer would be \$30.80 per acre for the 400-pound application of 10-10-0 on the root rot areas, \$24.60 per acre for the 400-pound application on healthy areas, \$16.02 per acre for the 200-pound application on the root rot area, and \$14.16 per acre for the 200-pound application on the healthy areas.

These increases, if maintained in future tests, indicate that the application of a 10-10-0 fertilizer in June or July after draining would be profitable not only in root rot areas but over the whole field.

In three tests, one of which was in a root rot area, 200 pounds per acre of 20% ammonium sulphate gave an average increase of 3.1 barrels per acre, while 200 pounds per acre of 20% acid phosphate gave an average increase of 1.5 barrels per acre.

## **Late Blight of Irish Potatoes . . . C. W. Edgerton and L. H. Person**

Because of cool weather and frequent rains in the spring of 1944, conditions occurred which were ideal for the development of late blight of Irish potatoes, and losses were the most severe known in this State, being estimated at 40 per cent of the entire spring crop.

The fungus causing this disease, *Phytophthora infestans*, is probably unable to live in Louisiana during the hot summer months, and since the fungus can live from one season to the next in tubers stored in the north, it is undoubtedly introduced each year in and on tubers shipped in and planted. For these reasons the State Department of Agriculture in 1944 placed a zero tolerance on the fungus. All certified potatoes are inspected by State inspectors before they are released, and potatoes suspected of being infected with this fungus are sent to the Department of Plant Pathology to be tested. If found to be infected the car of seed cannot be sold for seed potatoes in Louisiana. Two cars of seed potatoes were found infected in 1945 and rejected as seed potatoes.

## **Chemical Treatment Reduces Pink Root Infection in Shallot Sets . . . E. C. Tims**

Pink root is the most serious disease of shallot in the State. The disease is carried over in the soil from year to year, but is also carried in the roots of infected sets. Pink root apparently causes more injury if diseased sets are used than if healthy sets are planted in diseased soil. Chemical treatment of pink root infected shallot sets reduced the amount of disease (dipped in mercuric chloride 1-1000 for 20 minutes before planting). In other tests the disease was completely eliminated by soaking the sets in Ceresan 1 pound to 40 gallons of water, drying them, and then dusting the sets with Arasan.

# *Poultry Research*



## **Egg Coolers for the Farm Are Worthwhile . . . C. W. Upp and B. A. Tower**

During the summer of 1944 (May thru August) nine separate trials were conducted with farm egg coolers. These trials involved 6,500 eggs each of which was identified and graded two to four times.

Experience to date certainly justifies the construction and use of an egg cooler in order to be able to sell eggs of better quality. It is equally evident, however, that the statement "The refrigerator is the best place on the farm to hold market eggs" is true. Results to date appear to justify the following statements:

1. Eggs should be gathered two or three times per day and kept in the shade in open wire baskets or spread out on cooling trays until placed in the coolers.

2. The coolers should not be opened during the warmer parts of the day.

3. The coolers are more effective (i. e., average temperatures lowered) if they are left open at night then closed by 6:00 A. M. This makes necessary two doors, an outer insulated one and an inner one covered with hardware cloth or wire netting, to protect the eggs at night.

4. The coolers, by all means, should be located in a good shady place, under a large tree or under a building (on the north side). Artificial shade can be used.

5. The average daily temperature (determined by average of maximum, minimum, 6:00 A. M. and 5:00 P. M. temperatures) of the coolers is about five degrees lower than average daily room temperature. This may seem small but the greatest benefit is in avoiding the high temperatures of the hottest part of the day. The coolers average 12 to 15 degrees lower than the maximum room temperature or outside (shade) temperature. The higher humidity in the coolers retards evaporation. The coolers show to particular advantage during periods of successive hot days.

6. Humidity in the humidor, fan room cooler, cave and sunken (vertical) tile coolers remains high, ranging from 89 to 100 relative humidity. Humidity often approached saturation, particularly at 6:00 A. M.

## Quality of Eggs in Coolers vs. Those Held at Room Temperatures

Of all eggs held in the coolers one to seven days in 1944, 59.3% graded as A as compared to 29.9% of those held at room temperature while 68% of the refrigerator held eggs graded as A's. Eggs of C grade when removed at the end of each week averaged .5% for the refrigerator, 2.7% for the four coolers and 12.7% for eggs held at room temperature. This shows that the coolers are really worthwhile as preservers of egg quality on the farm.

Eggs held at room temperature varied from 26% to 96% A's and B's (B or better). The wide fluctuation in quality of eggs held at room temperature is due to the weather during the particular week they are held. The percentage of A and B eggs when held in the refrigerator averaged 99.5%. The quality of the eggs held one to seven days then graded, i. e. as if sent to market at that time, has not varied greatly for one cooler as compared to another. Eggs held 1, 2 and 3 days practically all (over 99%) graded B or better with a high percentage (approximately 80%) making A grade.

## Effect of Length of Time Held on Quality

The quality of market eggs decreases during each additional day they are held on the farm. This decrease in quality is least in eggs held in a refrigerator and by far the greatest in eggs held at room temperature. All eggs held in 1944 (in four coolers, in the refrigerator and at room temperature) were grouped according to length of time held. The quality decreased as indicated below:

	As placed in coolers	Days held in Coolers						
		1	2	3	4	5	6	7
% grade A	90	73	67	57	49	46	40	28
% grade B or better	100	100	99.6	99.2	97.8	95.4	89.6	81.8

The lesson is very clear. *"Get those eggs to market at least twice a week if coolers are used".*

## How Do Cooler-Held Eggs Keep in Storage\*

It is not safe to keep eggs in coolers longer than three days if they are to be placed in cold storage. Mold development was great, particularly in some coolers (humidor and fan-room cooler) for eggs held five, six or seven days in coolers and then kept in cold storage for three months. Fortunately, at the time of year when egg coolers are of most value (i. e. during summer) few Louisiana eggs are placed in storage.

Because of the difficulty in controlling mold development and in having an adequate supply of water, the humidor cooler and the fan-



room cooler are recommended, only with reservations. The humidifier cooler is effective and may be used if two sets of burlap curtains are provided (used during alternate weeks) and other precautions are taken such as use of formaldehyde or bichloride of mercury solutions, to keep down mold development. It is not advisable to keep eggs that are to be placed in storage in such coolers for longer than three days, if at all. The fan-room cooler consisted of a small insulated room equipped with an electric fan which forced moist air thru the room. Water dripped thru a pad of excelsior and the air was drawn thru this pad. A cooler of this type is of doubtful practical value with the possible exception of use on commercial market egg farms or by egg buyers. Detailed information concerning a cooler of this type will be supplied upon request.

Several shipments of eggs were sent from Baton Rouge to New Orleans and to Shreveport, and from Calhoun to Baton Rouge to test the shipping quality of eggs held in the coolers. At Shreveport and New Orleans the eggs were regraded by Federal-State inspectors. This served to check the grade after arrival at market and made it possible to compare the grading of the experiment station grader with that of the Federal-State graders. The grading of these different individuals checked quite closely in nearly all cases. The eggs withstood shipment well and the loss in grade during handling and shipment was moderate.

## **Dried Muskrat Meal in Chick Rations . . . O. E. Goff**

### **Chick Growth**

A study of feedstuffs peculiar to Louisiana instigated the collection and processing of muskrat carcasses into dried muskrat meal and the use of this product as an animal protein supplement in poultry rations. The chemical analysis of muskrat meal is given in the report of the Louisiana Agr. Exp. Station for 1942-43.

During the past year four feeding trials, utilizing 1175 chicks, have been conducted in comparing the value of muskrat meal, commercial meat scraps (meat and bone meal) shrimp meal, fish meal and soybean oil meal. On a chemical basis eight pounds of muskrat meal contains the same amount of crude protein as ten pounds of meat scraps. When the rate of gain per chick, to eight weeks of age, is used as an index the muskrat meal was of greater value than meat scrap.

Commercial meat scrap was mixed in all-mash rations at levels of five, ten and fifteen percent while other rations contained four, eight and twelve percent dried muskrat meal so that the percent protein from meat scrap and dried muskrat meal was the same at comparable levels. In each instance the chicks receiving muskrat meal made greater

gains than did chicks fed rations containing commercial meat scraps, although the differences were not in every instance statistically significant.

The results obtained cannot be fully explained on protein content alone, thus the differences in the response of chicks to these feeds may be due in part to the difference in amino acid content or other factors carried in the muskrat meal.

### **Taste-tests**

When the experimental chicks were eight weeks of age representatives from each lot were prepared for broiling and frying. Twenty-six families, embodying seventy-seven individuals, prepared these broilers either by broiling or frying; every individual reported that no difference was detected in flavor between the lots of chickens supplied them. Other individuals from the experimental lots were quick-frozen and kept in storage from May until January. At various intervals taste tests were conducted on these broilers. At no time could any difference in flavor be detected.

### **Dry Rendering Plant**

Another phase of this project includes the construction of an experimental dry rendering plant for use in rendering muskrat carcasses. At the present time this equipment is under construction in cooperation with the Dept. of Agricultural Engineering.

## **Sulphur for Poultry Investigations . . . O. E. Goff**

### **Sources of Vitamin D**

The problem of supplying vitamin D to chicks fed rations containing sulphur has received further consideration during this past year. Seventeen hundred New Hampshire chicks were used in seven laboratory trials in these studies. All chicks were grown to four weeks of age indoors, in battery brooders and received identical rations until four weeks of age at which time the experimental rations were fed.. For those chicks receiving sulphur the feeding procedure developed at this station as a coccidiosis preventive treatment was followed; that is, delay feeding sulphur until chicks are ready to turn on range. It is undesirable to feed sulphur to chicks younger than four weeks of age. Feed a ration containing five percent flowers of sulphur and 2½ percent number 10 charcoal for one week and thereafter a ration containing 2½ percent sulphur and 2½ percent charcoal. (Full details regarding the use of sulphur in coccidiosis prevention are presented in L.S.U. Agr. Ext. Service Timely Poultry Topic, Vol. 3 No. 1). This plan of feeding was followed in these investigations. However, chicks were

either confined in battery brooders indoors or kept in lamp-heated brooders outdoors so that conditions might be controlled.

Although the rations contained from two to five times the amount of vitamin D usually fed in starting and growing rations, chicks started during the fall and winter and exposed to direct sunshine or "skyshine" grew at a faster rate than did chicks receiving identical rations but grown indoors. Chicks started in late spring grew better indoors than comparable chicks grown out of doors, primarily, due to the hot days prevalent during June.

Growth, feed utilization and bone development were satisfactory when chicks were grown out of doors regardless of dietary sources of vitamin D. (The sources of D were cod liver oil, Ration ayd and Del-sterol.) Furthermore, sunlight or "skyshine" in each instance replaced the dietary need for this vitamin.

These findings substantiate previous work and reemphasize the need of chicks for direct sunlight to give satisfactory growth and bone development when sulphur is included in the ration.

### **Flower of Sulphur Fed Broilers**

An inquiry pertaining to the development of "off flavor" in fryers fed on the recommended sulphur-containing ration for the prevention of coccidiosis and subsequently slaughtered and kept in freezer-lockers instigated further observations during the year.

In previously published papers from this Station it had been reported that only negligible amounts of sulphur were found in the liver, blood and other tissues of chicks fed rations containing sulphur and in many cases did not materially differ from controls.

It is a routine practice at this Station to place in storage fryers and broilers fed on rations containing sulphur. No deleterious effects have occurred in storage. However, to further observe effects of storage on broilers fed rations containing sulphur, experimental broilers and controls were slaughtered, individually wrapped in "freezer-locker" paper, quick frozen and stored at zero temperature. At irregular intervals, extending from April to January, broilers were taken from storage and taste-tests conducted by several persons. No "off-flavors" developed on rations containing sulphur.

Methods of processing, holding conditions, wrapping materials, and length of storage period should be given consideration in maintaining flavor in freezer-locker establishments.

### **Sulphur in Poultry Lice Control**

Additional data have been collected substantiating previous data that 325 mesh sulphur, either conditioned or unconditioned, is effec-

tive in preventing the occurrence of lice in a flock or in eliminating an outbreak. (See L. S. U. Agr. Exp. Sta. Annual Report for 1942-43.)

## **Simple Rations and Green Feed Give Satisfactory Results . . . B. A. Tower and C. W. Upp.**

When relatively simple rations are used, the availability of good green feed cannot be over emphasized. Many of the minerals, vitamins and proteins that are needed in small quantity are supplied by green feed. The poultryman in Louisiana has a real advantage because it is possible to let the layers run outside and have green feed the year around (except on cold, rainy days). Too often, naturally occurring green feed crops are depended upon entirely. This does not provide adequate green feed. In winter such crops as rye grass, or oats and clover should be provided and in summer lespedeza, bermuda grass, carpet grass and sudan grass can supply the needed greens. The greater need of green feed with more simple rations was illustrated by the increased consumption of green feed in the pen receiving only shrimp meal, corn and oats.

The hazard of introducing strange stock into the laying flock was realized last winter. Infectious colds occurred in four of the six experimental pens following the introduction of new stock in an adjoining house. Production dropped very low during December, January, and February, averaging 10.4 eggs for this period as compared to 30.2 eggs in the two pens not infected. This infection made it impossible to get a fair comparison of the average annual egg production in the several pens. The mortality was low in all of the experimental pens ranging from none to 12%. The body weight and the size of the eggs laid did not differ significantly for the hens on the different rations. The relatively simple rations used supplemented by good green feed were adequate to give satisfactory hatchability in all pens. The hatchability of fertile eggs ranged from a low of 74.3% with the pen fed shrimp meal, corn and oats to 82.9% in the 32% supplement (with grain free choice) pen.

The important fact is that simple rations give satisfactory results when supplemented by green feed.

## **Productive Qualities Improved by Breeding . . . C. W. Upp**

The popularity and value of the Poultry Breeding Project has continued this past year. Private R. O. P. breeders in Louisiana are likewise getting recognition. More hatcherymen are recognizing



the value of using R. O. P. males to head all or most of their egg-supply flocks. Such important practical characters as rate of growth, early feathering (so broilers do not have pin feathers), egg production, egg size and how well the eggs hatch (hatchability) are inherited and are thus improved by good breeding stock. Some few purchasers, without experience in poultry breeding, have questioned the cost of R. O. P. chicks and breeding stock. This comes from a lack of appreciation of the time, expense and hazards that are involved in the production of such stock.

Improvement by breeding is an accepted fact, but the job is not as simple as most laymen think it is. Constructive breeding requires large numbers of birds, exacting records, much work and includes some disappointments. Experiments underway at this station for several years have shown the difficulty of improving productive qualities with a limited number of matings. The use of a minimum of ten breeding pens, with 500 or more female progeny trapnested each year is much to be desired. With only a few breeding pens in use too much depends upon the performance and transmitting ability of the few sires used. Numerous groups of sisters must be tested to identify the better families. The fact that a hen lays 250 eggs a year and is mated to a male with similar breeding background is no assurance that all of her daughters will do likewise.

The information needed cannot be obtained without accurate, detailed, individual records. Hens must be trapnested to determine individual production. They must be mated to one male only and the chicks identified at hatching (and throughout life) so exact parentage can be determined. The performance records of the family, i.e., groups of sisters are the best criteria to use in judging the breeding value of their parents and their own probable worth.

The job of trapnesting six to eight times per day, five to seven days a week throughout the year is a bigger job than most flock owners can undertake. The additional work of pedigree-hatching, keeping egg records, mating records, hatching records, etc. in addition to the routine management of the flock makes it necessary for R. O. P. (record of performance) chicks and breeding stock to sell at prices much higher than those obtained for non pedigreed stock.

Every experienced breeder knows that disappointing results are sometimes obtained from very promising breeding pens, but the assurance of obtaining much better results, on the average, from well bred stock has led many Louisiana hatcherymen and flock owners to realize the value of better breeding stock.

## **The Poultry Breeding Project Helps Louisiana Poultrymen . . . B. A. Tower**

The 1944 season of the Poultry Breeding Project was by far the best in its four year history. Approximately 10,000 R. O. P. and 15,000 certified chicks were hatched, and with the exception of 3,000 R.O.P. chicks retained for the project, all were sold to Louisiana poultrymen for the improvement of flocks throughout the state. In addition to the above, around 1,000 surplus growing cockerels and mature R.O.P. males were sold to flock owners who were short of breeding males. Many favorable comments have been received on the quality of chicks and mature stock sold in 1944.

From the R.O.P. chicks retained for the breeding project, approximately 1200 R.O.P. candidate pullets were grown out of the Barred and White Plymouth Rock, Rhode Island Red and New Hampshire breeds, and are now being trapnested. All pullets that qualify for R. O. P. will be eligible for the R. O. P. breeding pens in 1946. Hatchability of eggs from the pullets has been better than average, and many fine certified chicks are being shipped to poultrymen throughout the state.

# *Rural Sociology*



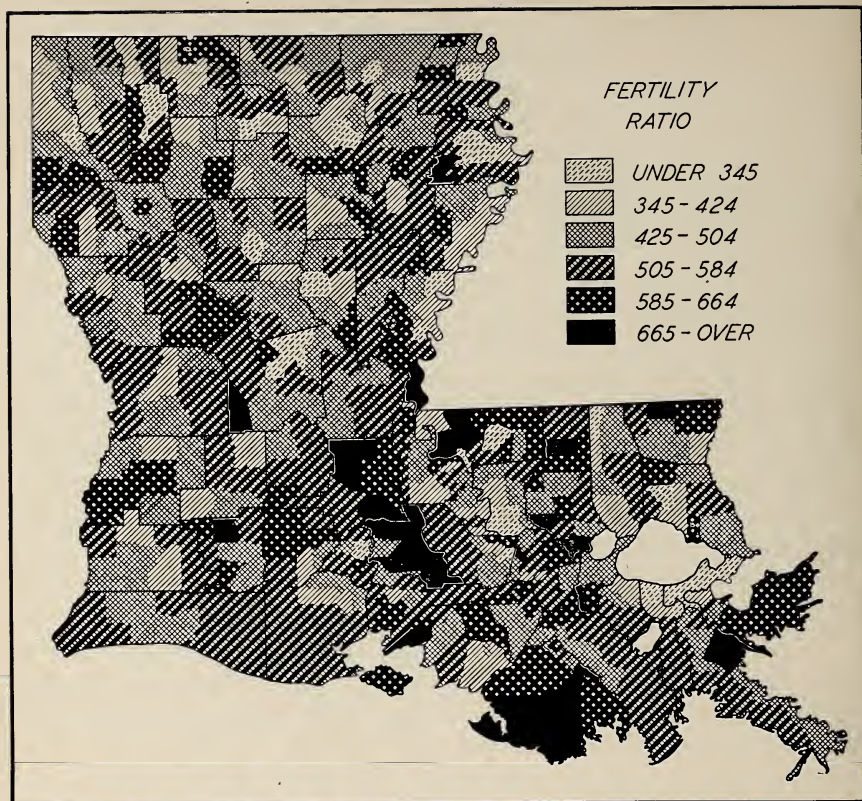
## **Differential Fertility in Louisiana . . .** Allan Beegle and T. Lynn Smith

This is a study of the patterns of reproduction and differentials in fertility throughout the state of Louisiana. In it the attempt is being made to gauge the speed with which the population is reproducing, and to compare the fertility of the population in Louisiana with that of other states and the nation as a whole. Particular emphasis is being placed upon the analysis of existing differentials in fertility in Louisiana, especially those between whites and Negroes, types of farming areas, the different ethnic groups, the rural and urban populations. Our greatest interest is in determining the extent to which the farm population is responsible for the replacement and growth of the population.

Since our studies and others have shown that the ordinary birth rate has little validity, another measure of reproduction, the fertility ratio, is employed in this project. The fertility ratio is obtained by relating the number of children to the number of women in the child-bearing ages in a given population. The index we are using is as follows: children under 5, divided by the number of women aged 15 to 44, multiplied by 1,000. Several thousands of these ratios have been calculated including those for each of the parishes and wards in the state, with the data further subdivided by race and by residence whenever it is possible to do so. Figure 1 presents one of the most important series of these, showing the variations in reproduction rates in Louisiana by wards.

The analysis is not yet completed, but the following are among the more significant findings to date.

1. Rural areas of the state are producing far more than their proportionate share of Louisiana's future inhabitants.
2. Within the rural portion of the state the more removed an area is from urban influences, the higher its rate of reproduction.
3. The French and Catholic portions of Louisiana are characterized by much higher fertility ratios than Anglo-Saxon and Protestant Louisiana, this being true of both whites and Negroes among the urban, the rural-nonfarm and the rural-farm populations.



Number of children under 5 per 1,000 women aged 15-44 in Louisiana, by Wards, 1940.

4. The delta cotton plantation sections of Louisiana have the lowest rates of reproduction of any of Louisiana's rural territory. The rates in these sections are very little above those in the urban centers.
5. Contrary to what is generally believed and accepted, Negroes do not appear to be reproducing any more rapidly than whites. If the Negroes enjoy any advantage at all in this respect it is merely because they still are slightly overrepresented in the farm population.

## Health and Mortality in Louisiana . . . Louise Kemp and T. Lynn Smith

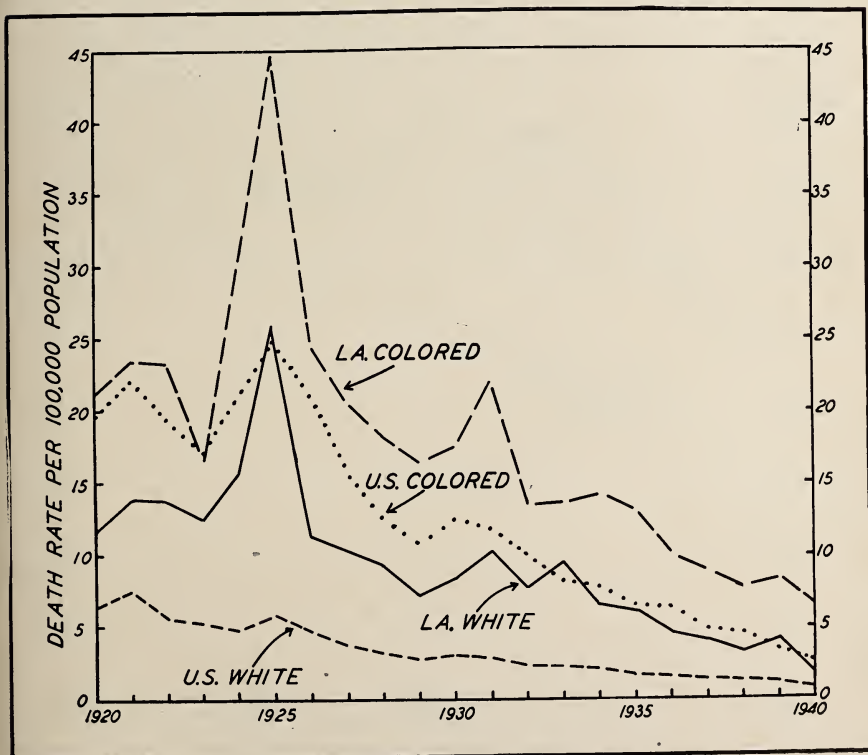
This study is now complete and the following is a summary of the findings:



Diseases of the heart are far out ahead among all the causes of death in Louisiana. Each year they claim around 6,000 of the state's citizens, killing people at the rate of more than 250 per 100,000 population.

Pneumonia and influenza, nephritis, cancer, diseases of the nervous system, tuberculosis, accidents, accidents other than those in which motor vehicles are involved, causes associated with premature birth, syphilis, and motor vehicle accidents, in the order named, also are included among the ten leading causes of death in the state. Together these ten categories account for three fourths of all the deaths that occur annually.

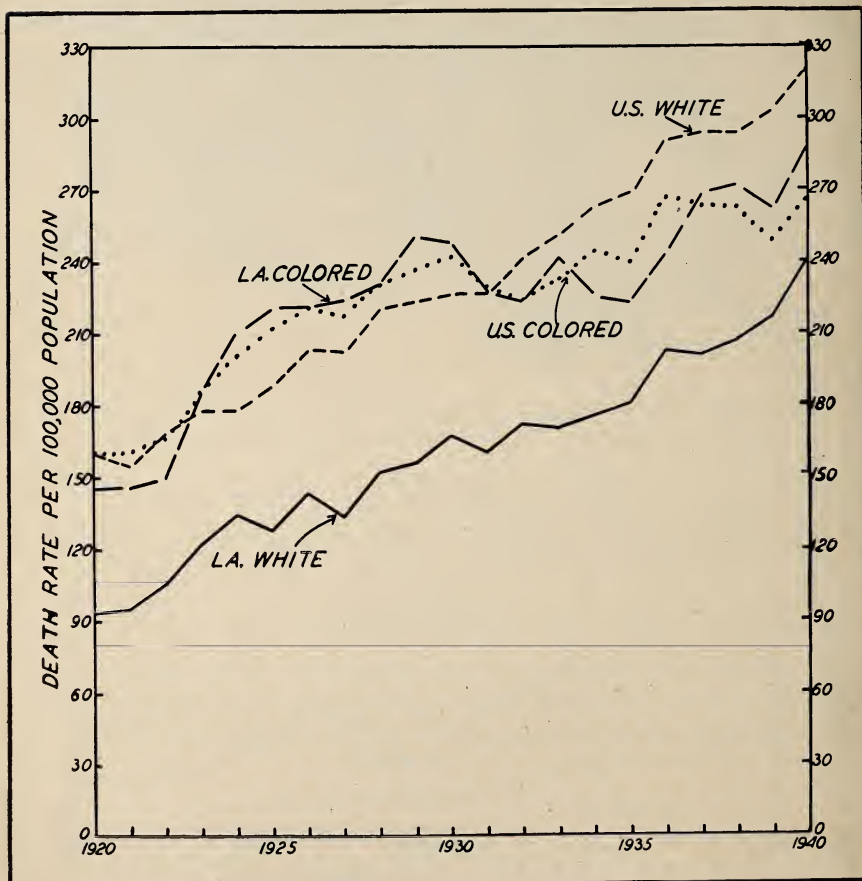
Louisiana's farms enjoy a definite advantage over its towns and cities from the standpoint of health and longevity. This is true for both whites and Negroes and for practically all age groups. The rural people of the state are less likely to be decimated by contagious diseases, fall by the way because of degenerative ailments, or lose their lives by accident or through violence than their fellows in the



Trends in the Death Rate from Typhoid Fever, Louisiana and the United States, by Race. (Great improvements are being achieved in the control of typhoid fever and other transmissible diseases, but Louisiana continues in an unfavorable position in comparison with the Nation).

towns and cities. However, malaria, typhoid fever, whooping cough, diphtheria and pellagra take a proportionately higher toll of life in rural than in urban areas.

Louisiana Negroes have much higher mortality rates than their white fellows. The racial differences are greatest in infancy, and have largely disappeared by the time age 65 has been reached. Syphilis, pellagra, typhoid fever, homicide, whooping cough, malaria, deaths associated with childbirth, tuberculosis, pneumonia and influenza and diarrhea are all included in the list of these in which the death rate of Negroes is more than twice that of whites. However, Negroes are much less likely to die in motor vehicle accidents or by self destruction than are the white people of Louisiana.



Trends in the Death Rate from diseases of the heart, Louisiana and the United States, by Race. (Mortality from this, and other degenerative causes, is rising very rapidly, but the rates in Louisiana are lagging behind those in the Nation.)

Louisiana compares unfavorably with the nation in the control of transmissible diseases. Among both whites and Negroes, rural and urban, the death rates from most of the important diseases of this type are above those for the nation. See Figure 2. However, up until the present time the various causes of death that are associated with old age and the degeneration of the body do not claim as many persons in Louisiana per 100,000 population as they do in the nation as a whole. See Figure 3.

Health in the state is improving rapidly. In 1940 the mortality rates from pneumonia and influenza, tuberculosis, typhoid fever, malaria, diphtheria, and most other contagious diseases, were only fractions of what they were in 1920. Deaths associated with childbirth and homicides also are rapidly declining. Pellagra and other deficiency diseases are being reduced greatly. However, such ailments as heart disease, cancer, diabetes, and ulcers of the stomach are mounting fast among the causes of death. Motor vehicle accidents and suicide were also taking a much larger toll in 1940 than they were in 1920.

The saving in life achieved during the period 1920 to 1940 was much greater, relatively, among the Negro than among the white population of the state. For nearly all of the important causes of death the rates for the two races were much nearer one another at the close of the period than they were at the beginning.

Louisiana has hardly kept pace with the nation in the control of transmissible diseases, but the state has maintained its favorable position with respect to mortality from most of the degenerative causes of death.

# *Seed Increase Work*



## **Corn . . . W. J. Andrews**

Three tests of corn varieties and hybrids were conducted during 1944 in the parishes of Webster, DeSoto and Madison. Louisiana hybrids 3802 and 468 outyielded the highest yielding open-pollinated variety. Increases ranged from 4.7 to 11.8 bushels per acre or 16 to 39 per cent.

There was very little difference in the average yields of Louisiana hybrids 468 and 3802.

Similar yield tests were conducted in the parishes of St. Landry and Iberia. On these two tests there was little difference in the yields of the Louisiana yellow hybrids and the leading open-pollinated variety. However, it was noted here that there was much less lodging of the yellow hybrids than in the open-pollinated varieties.

## **Cotton . . . W. J. Andrews**

One hundred acres of Station Miller cotton were grown for seed increases in 1944 and 18 tons of seed were saved for 1945 increase planting.

Five acres of Dixie Triumph 366-789 were grown and about one ton of seed was saved.

## **Soybeans . . . W. J. Andrews**

Four hundred acres of L. Z. soybeans and 1100 acres of Acadian soybeans were grown for seed increase in 1944. These two varieties were released for commercial planting in 1944. Forty-five hundred acres of Pelican soybeans were also grown. This was the second year of increase of the Pelican variety.

The growers of all three varieties agree that for interplanting with corn these varieties are as good as any beans ever produced, and in addition, these yellow beans will produce more seed per acre than any of the viney-type beans.

## **Vegetable Crops . . . Joseph Montelaro**

The work in 1944 was largely concerned with the increasing by Louisiana growers of new varieties of vegetables bred by the Agricultural Experiment Station of the Louisiana State University.



Growers were assisted in producing and selling the following seed and plants:

Collards (La. Sweet)	1,050 lbs.	@ \$ .30	\$ 315.00
Corn (La. Bayou)	2,100 lbs.	.15	315.00
Corn (U.S.D.A. 34)	16,800 lbs.	.14	2,352.00
Okra (Green Velvet)	17,700 lbs.	.20	3,540.00
Allyear Cabbage	300 lbs.	3.00	900.00
Onion (C-5 Creole)	1,450 lbs.	3.25	4,712.50
Onion Plants	1,200,000 plants	1.50/M	1,800.00
Shallots (La. Pearl)	2,100 lbs.	.15	315.00
Watermelon (Dixie Queen)	300 lbs.	1.50	450.00
Strawberry Plants	325,000 plants	6.00/M	1,950.00
Sweet Potatoes	7,000 bushels	3.00	21,000.00
			<hr/> \$37,649.50 <hr/>

# *Sugarcane*



## **Varieties . . .** E. C. Simon and F. W. Berthelot, Jr.

The variety CP 34-120 mentioned in the last Annual Report is now established as one of our major sugarcanes. It should prove an extremely valuable variety for the industry. The varieties CP 33-310 and CP 33-425, which were released in the fall of 1943, are gaining in importance in those sections to which they are adapted.

Of the unreleased sugarcanes now under intensive test, four varieties, CP 36-13, CP 36-19, CP 36-105 and CP 36-183 are now under extensive increase on the Experiment Station test fields and at the Primary and Secondary Increase Stations which the Sugar Station has in cooperation with the American Sugarcane League. Of these varieties, CP 36-105 has been most extensively tested. All indications are that it will be released as a commercial sugarcane in the near future. CP 36-105 has several very desirable characteristics complementing the desirable characteristics of the recently released CP 34-120.

The variety CP 36-13 is of great interest because of the fact that it possesses the genetic factors necessary for successful windrowing of sugar cane for the factory. We have only limited information on the variety at present.

The variety CP 36-19 has a very satisfactory sucrose content which is its most desirable characteristic.

The variety CP 36-183 has an excellent growth type and a generally satisfactory sucrose content and should prove a good field yielder.

Last fall six new varieties were sent to the Experiment Station test fields and approximately thirty unreleased varieties are now being tested on these fields.

## **Sugarcane Test Field Work . . .** C. B. Gouaux

In 1944 there was a total of thirty-nine sugar cane varieties, consisting of nine commercial field canes and thirty unreleased varieties under experimental cultivation as fall plant cane and stubble on the test fields.

### Planting of Test Fields, Fall 1944

The fall planting program of the eight Experiment Station test fields included the following plantings:

- (1) Mair plot tests: two to four commercial canes and four to six promising unreleased varieties.
- (2) Introductory plots: F. 36-671, F. 36-819, CP Nos. 38-26, 36-178, 36-197 and 36-203.
- (3) Increases of promising varieties (unreleased): CP 36-105, approximately 40 acres at eight test fields; CP 36-183, approximately 20 acres at eight test fields; CP 36-19, about five acres at two test fields; CP 36-13, another promising unreleased variety, was under observation as plant cane on a small plot basis in 1944. All available seed cane of CP 36-13 was planted on the test fields.

The Sterling test field located in St. Mary parish near Franklin, was changed to Katy plantation, which is about three miles west of the Sterling location. The new test field was planted October 5-6, 1944 and will be known as the Caffery test field.

CP 33-310 which was released in 1943 for use especially in the western area continued to show earlier maturity and higher sucrose than Co. 290 and CP 29-116 at the Billeaud and Youngsville test fields.

Although 34-120 and CP 33-243 led in yields at the Bunkie and Meeker test fields, CP 29-320 is still the most important field cane there, due to its superiority in the following important qualities: early maturity, erectness, adaptability to soil and climate, higher sucrose and better adaptation to mechanical harvesters.

Results on Sharkey soil, black land, indicated that CP 34-139 and CP 29-116 ranked first and second as fall plant cane, while CP 34-21 and CP 33-224 ranked first and second as first stubble. CP 29-116 was the only commercial cane in this lot.

CP 36-105 and CP 36-183, were the two most promising unreleased varieties. The following six unreleased varieties can be classed as secondary canes, with a possibility that they can be of use in some special localities: CP Nos. 34-21, 34-92, 34-139, 36-55, 36-161 and 36-191.

# *Veterinary Science*



## **Internal Parasites of Workstock . . . A. H. Groth**

The small round worms found in the large intestines of horses and mules can be successfully removed by the administration of phenothiazine in capsules without a period of fasting.

Mules tolerate phenothiazine very well, unless they are in a badly weakened condition. Horses do not tolerate the drug as well as mules, and this is especially true of horses on rations of low nutritive value. Before treating horses with phenothiazine the ration should be improved by feeding yellow corn instead of white corn. Oats, wheat bran, and a legume hay plus a mineral supplement are also of value in improving the general condition of the workstock.

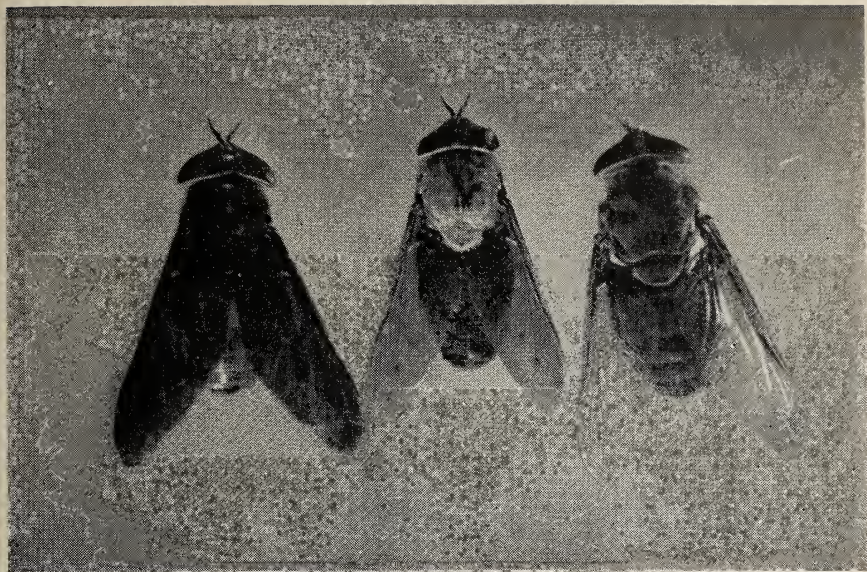
Aged animals should have the teeth examined, and irregularities should be corrected by a qualified veterinarian in conjunction with treatment against internal parasites.

## **Anaplasmosis in Cattle . . . P. L. Piercy and Eva Stanford**

Although many different kinds of laboratory animals have been tried, only cattle react satisfactorily for anaplasmosis experimentation. Calves from which the spleen is surgically removed (splenectomy) are preferred at this Station for reasons that include (1) simplicity of the operation and good recovery therefrom, (2) economy in animal cost, housing, feeding, care and handling, (3) early adaptability and uniform susceptibility (may be splenectomized as early as 2 days of age and placed on experiment 7 days later), (4) typical reaction to the disease and equally valuable results. In contrast, if calves up to about 18 months of age are not splenectomized, their reactions to anaplasmosis are commonly very mild and less valuable experimentally. Preliminary data indicate that splenectomized calves show a higher degree of reaction uniformity when infected from the same source. Such uniformity is reflected in the time required for symptoms to appear and in severity of the reaction. Additional reactionary uniformity is needed and being sought.

Attempts to enlarge upon existing meager knowledge of the causative agent are being made by efforts to grow it under laboratory





Large "Horseflies" and Other Blood-sucking Agents are Prevalent Natural Transmitting Agents of Anaplasmosis in Gulf Coast Regions.

conditions outside the animal body. While preliminary results are not altogether encouraging, they merit continuation of this phase of study in the hope of uncovering facts of practical diagnostic or control significance.

Specific medicinal treatment of cattle with anaplasmosis is unrecognized. Respective medicinal agents experimentally used in limited degree during the year have been Sodium Sulfadiazine (a soluble sulfonamide, 1:1000 and 1:500 Metaphen (antiseptic), Anthiomaline (an antimony preparation), Thio-Bismol (a bismuth preparation), Methyl Violet (a medicinal dye), sodium cacodylate and Aricyl (arensical preparations). All were administered by injecting directly into the blood stream and none acted to destroy the causative agent in the blood of infected animals as indicated by subsequent, carefully controlled studies.

## Parasitism in Domestic Fowls . . . A. C. Todd

### Taxonomic Investigations

Identification of poultry parasites collected in Louisiana during 1944 has revealed one species in the nematode genus *Capillaria*, which has not been reported previously. Two specimens of the unknown,

but not necessarily new, species of *Capillaria* were recovered from the small intestine of a New Hampshire chicken raised at the L. S. U. poultry farm.

### Experimental Investigations

Experiments have been started with the cecal worm of chickens, *Heterakis gallinae* (Gmelin, 1790): age resistance of the host, and acquired immunity of the host to the cecal worm are being studied.

#### Age Resistance

Experimental infections reveal, at present, a striking increase in natural resistance to *Heterakis gallinae* when chickens aged one month are compared with chickens two weeks old; the increase in resistance is demonstrated by a decrease in the percentage of worms developing to maturity, in the absence of previous infections, when known numbers of infective eggs are fed to chickens. Chickens older than one month have not shown an increase in resistance over that of chickens one month old.

#### Acquired Immunity

Six weeks old chickens were given an immunizing infection with the cecal worm, followed three weeks later by a test infection which sought to demonstrate acquired immunity. Control chickens were given the infection at the same time. The immunized birds developed two per cent less worms of the test infection than did the control birds, demonstrating a low-grade acquired immunity. Weight graphs of the two groups of birds reveal a significant decrease in the average daily gain 48 hours after infection. The decreased average (and individual) gain in weight remains in effect for an additional 72 hours. No evidence has been found which would indicate a continued harmful effect of the cecal worm upon its host, at least when infections average from fifty to one hundred worms per bird.

## Gastro-Intestinal Nematode Parasites of Cattle . . .

R. L. Mayhew

The work done during the past year has largely been a continuation of the studies of a number of phases of the problem which has been in progress for the past several years, particularly those related to immunity. Among these results may be mentioned that further observations on calves on pasture continue to indicate that quality and quantity of feed have no influence on the degree of infection in immune animals. Additional observations indicate that much damage is caused by the larvae of the parasites between their entrance into the calf and the time they become adults. As a result of this,

diagnosis is difficult because eggs are lacking in the manure, and the small microscopic larvae are generally not detected at postmortem. Treatment is probably of little or no value at this stage of infection.

## **Crotalaria spectabilis Poisoning in Louisiana Livestock . . . P. L. Piercy and L. L. Rusoff**

*Crotalaria spectabilis* which is extensively grown in southeastern United States as a leguminous cover crop is believed to have caused Louisiana livestock losses. On one plantation alone during 1944, more than 40 cattle died during the first eight months of the year after grazing on pastures harboring the plant. Cattle will eat tender portions of the plant, especially when good quality grasses are scarce. Due to variations in germination time, seeds may produce new plants over a period of years.

Experimental feeding of *C. spectabilis* to a steer and to chickens terminated fatally and confirmed the poisonous character of the plant. The poisonous principle, an alkaloid (monocrotaline), was chemically isolated from the stem, leaf, and seed portions of the plant, being most concentrated in the seeds. Experimentally, one chicken died within 72 hours after eating about 100 seeds. Under natural conditions poisoning is relatively slow in developing and symptoms may not appear until after three to six months of grazing on pastures harboring the plant. Deaths do not all occur at once but are spontaneous throughout the year.

Symptoms in animals poisoned by *C. spectabilis* include loss of appetite, walking in circles, weakness, muscle twitching, frothing from nose and mouth, restlessness (alternate standing and lying down), finally remaining down with legs in slight motion until death. Post-mortem examination reveals hemorrhagic (bleeding) areas of pin-point to much larger sizes throughout much of the body, especially prominent on the heart and in the body fat, deposit of clear jelly-like material in the abdominal cavity, thickened stomach wall, mottled liver, and greatly enlarged gall bladder.

No effective medicinal treatment is known. The obvious preventive measure would be to not allow livestock to graze on pastures where *Crotalaria spectabilis* is present.

## **Brucellosis in Swine . . . A. H. Groth and C. I. Bray**

Brucellosis — (Bang's disease) — (infectious abortion) in swine is caused by a germ similar to but not identical with the germ causing the same disease in cattle. The disease while apparently not as wide



spread in swine as in cattle is spreading alarmingly. It is not only a serious menace to the swine industry, but it is also a public health problem because the human is more susceptible to the swine strain than to the cattle strain of the germ.

The disease is usually introduced into a herd through the purchase of infected animals and may be spread through the ingestion by the animals of aborted fetuses and fetal membranes, as well as through contaminated feed and water. The boar may be a source of infection and he can be a spreader to sows with which he is mated.

As in cattle the most frequently observed symptom is premature birth of the young. Animals that have aborted once do not usually do so again. The time of abortion varies considerably, but it usually takes place between the sixtieth and ninetieth days of pregnancy.

Brucellosis in swine can be eliminated from a herd by regularly testing all breeding animals with the agglutination blood test, removing all positive animals from the herd, and moving the non-reactors to uncontaminated pasture. Having the sows farrow on clean ground as recommended in the McLean County System of swine sanitation should also be practiced. Infected boars should not be retained for breeding purposes. No satisfactory medicinal treatment is recognized and a satisfactory vaccine is not yet available.

## **Vaccination of Adult Cattle Against Brucellosis with Strain 19 Vaccine . . . A. H. Groth and S. E. McCraine**

The successful vaccination of heifer calves against brucellosis has caused many cattlemen to become interested in vaccinating adult cows with the same vaccine, Strain 19. While it appears that adult cows can be vaccinated effectively, sufficient time has not elapsed to draw definite conclusions as to the value of the method.

Certain points brought out by work on adult vaccination are:

1. Abortions frequently occur when adult animals are vaccinated during pregnancy.
2. In dairy cows there is usually an immediate loss of condition and a drop in milk production persisting from one to two weeks.
3. Reactors from vaccination cannot be distinguished from reactors that become naturally infected.
4. Vaccinated adults if negative or positive at vaccination will continue to react for a variable period of years and interstate shipment and sales will be restricted.



5. Abortions may be expected for several months in animals that are already infected at the time of vaccination.
6. Whole herd vaccination may have an advantage in incipient infection, and in beef herds in which calf production is the chief herd requirement, if done when the cows are open or in early pregnancy. All replacements should be vaccinated and calfhood vaccination should be continued.



## *Substations*



### **Fruit and Truck Experiment Station, Hammond . . .**

W. F. Wilson, Jr., Superintendent

#### **OKRA BREEDING**

The program for the improvement of the existing varieties of this crop includes the maintenance of a large collection of inbred strains for breeding material and genetic studies and the observation of new introductions from other sections.

In 1939, Louisiana White Velvet and Louisiana Green Velvet were introduced and are now available from regular seed sources. These varieties are of the type demanded by the canners, especially the Louisiana Green Velvet, and in addition have attained considerable popularity in the home gardens. The new variety, Louisiana Market, is being widely tested this year by growers and a volume of seed produced for the commercial seedsman. This variety should fill the needs of the home gardeners as well as the market gardeners for which it was developed. The fruit is of the short, thick, pod type. The pods are light green in color, round, smooth and have thick walls. The mature pods are approximately seven inches long while the marketable pods are two to four inches in length. The plant grows medium tall to tall with very little branching.

Production starts very early with nodes unusually close together for a tall growing variety, thereby insuring a large number of pods per plant.

The fruit is much easier to harvest without contact with plant than with the standard varieties because of the open arrangement of the leaves.

#### **PEPPER BREEDING**

Comparisons of the standard varieties in this area showed best yields from the variety World Beater. However, discrimination on the market in favor of the thick, hard-wall type of peppers as produced by the similar varieties California Wonder and Florida Giant forced the growers to use these lower yielding varieties. In 1938 a program for the development of varieties to meet the market demands and conditions prevailing in this area was established.

A selection from the cross made in 1938 between California Wonder and Corneli Special has been named Dixie Wonder and field tests with quantity seed production are under way this season. This variety produces fruit very similar in type to California Wonder and Florida Giant, which is the desirable one for the market. The qualities which make it a valuable variety for this area are pendant fruit, instead of upright fruit, and more foliage. These characteristics tend to prevent excessive injury by the sun to the young peppers as the season progresses, thus assuring greater size and number of marketable peppers during the latter part of the season. A single season's comparison with the high yielding variety World Beater gave yields equally as good.

### **CUCUMBER VARIETY TEST**

Straight Eight has consistently produced the largest per acre yields but due to the lack of dark green color has been less desirable for the market than Colorado and A. C.

One years' results show larger yields produced by Cubit, a new variety with excellent color, than by Colorado and A. C. This variety when grown in the spring is the only one that produces economical yields of well-colored fruits.

### **STRAWBERRY STUDIES**

#### **Effect of Rate of Application of a 4-12-4 Fertilizer**

Results from this test are interesting as very low yields were produced over the entire strawberry area due to unfavorable weather conditions. Single rows of plants produced as large yields from the smallest rate of application of 900 pounds per acre of the formula 4-12-4 as from any of the treatments used. Double rows of plants gave the most economical production from an application of 1500 pounds per acre of the 4-12-4 fertilizer which is consistent with the results over a period of years. Applications larger than 1500 pounds per acre produced lower yields than the standard or recommended 1500 pounds.

#### **Effects of Lime on the Production of Strawberries**

Tests of the use of lime on the acid soils of this area for the production of strawberries have been carried on for eight years. The more heavily limed areas, 5000 pounds per acre, with a pH 6.2 in 1938 produced an average yield of 32 crates per acre more than the untreated areas with a pH 4.4. The differences in acidity between the areas involved have disappeared during the eight seasons, and the yields were almost the same from all the areas in the test this past season.

The use of lime on the areas for the production of plants during the summer and fall has increased the number of plants by 50 per cent when applied at the rate of 1000 pounds per acre on soil that had not previously been limed.

### **PECAN VARIETY TEST**

Pecan trees in the Station orchard twenty years old produced the first crop of nuts in 1944 that has been worthy of recording during the past eight years. The yields in pounds per tree were as follows: Moore 78, Stuart 75, Dependable 65, Success 59, and Money-maker 25. Of this group the varieties Moore and Dependable were very poorly filled and were of little value.

### **North Louisiana Experiment Station, Calhoun . . .**

Dawson M. Johns, Superintendent

**Agronomy . . . Dawson M. Jones**

#### **Cotton**

Studies relative to the suitability of various varieties of cotton to the hill land soils of North Louisiana continue to support the recommendation of eight or 10 years standing that Station Miller is generally the most desirable variety to grow in this area. Station Miller produces a boll of excellent picking quality. The staple length is approximately one-inch when grown under normal conditions and the "gin turn-out" averages about 38 per cent. There are other varieties which produce comparatively well in the area, particularly, if better than the average fertilizer and cultural practices are followed in growing the crop. These varieties are Stoneville (including Coker 100) and Deltapine. On soils where Fusarium wilt prevails Dixie Triumph and Coker 4-1 are recommended.

#### **Corn**

Outstandingly higher yields have been obtained from Louisiana Hybrids than from the widely grown and well known open pollinated varieties. For several years tests have been conducted in which Louisiana Hybrids and open pollinated varieties have been compared and certain of the hybrid strains have consistently led in production by a margin of 20 to 30 per cent. Louisiana Hybrids 468 and 3802 are to be highly recommended throughout the hill area of North Louisiana. Other Louisiana Hybrids, namely: Nos. 178A, 498, 507, 497, 39A and 123, produce higher yields than open pollinated varieties and are also recommended.

Of the open pollinated varieties, the prolifics continue to produce more grain than the one ear varieties. However, the difference



in the average yield of the leading varieties of the two groups has been small. Jarvis and Cocke of the prolifics and Calhoun Red Cob, Tuxpan, and Sentell of the single ear group have been the most productive of the open pollinated varieties

### **Corn Fertilizers**

The importance of applying commercial nitrogen to corn is well recognized, especially where a good crop of a winter legume has not been turned under previous to planting the corn. Results from experiments underway now are variable with respect to responses obtained from applications of a super-phosphate and muriate of potash. However, the results definitely indicate that higher yields of corn can be produced on most North Louisiana farms by applying approximately 24 pounds of  $P_2O_5$  and 24 pounds of  $K_2O$  per acre providing 30 to 45 pounds per acre of nitrogen are used. During the past 15 years extensive corn fertilizer tests have been conducted to determine the value of nitrogen and in these tests an average of 12 to 18 bushels per acre of corn has been obtained from applications of 30 pounds of nitrogen per acre.

#### **Three Year — Cotton, Corn and Oat Cowpea — Rotation**

This experiment has been in progress more than 50 years. The rotation involves three treatments which are as follows:

1. Six tons of barnyard manure and sixty-five lbs. 20% superphosphate per acre.
2. 500 lbs. 6-8-6 per acre.
3. Check — unfertilized.

The fertilizer treatments are applied only to the cotton and corn in the rotation. Briefly, yields from the manure treatment have averaged slightly over 1000 pounds of seedcotton per acre, 35 to 40 bushels of corn, 25 to 30 bushels of oats and one and one-half tons of cowpea hay. Yields resulting from the use of commercial fertilizer have been smaller than those obtained from the manure-fertilized rotation. Yields from this treatment approximate 500 pounds of seedcotton, 30 bushels of corn, 20 bushels of oats, and 1500 to 1800 pounds of cowpea hay per acre. The unfertilized treatment of the rotation produced average yields of 30 to 100 pounds of seedcotton, three to 10 bushels of corn, seven to 10 bushels of oats and 600 to 1000 pounds of cowpea hay per acre.

Enough barnyard manure is not available on most farms to fertilize the entire cropland acreage sufficiently to obtain the above mentioned yields. However, it is significant to point out that similar yields of these crops should be obtained by growing winter legumes properly

fertilized with commercial fertilizer and turning them under for soil building purposes. For further information on this subject refer to Biennial Reports of the North Louisiana Experiment Station.

### **Corn Following Singletary Peas**

Singletary peas grown as a soil improvement crop prior to planting corn has increased the yield slightly over six bushels per acre.

### **Oat Fertilizers**

Nitrogen applied at the rate of 30 to 40 pounds per acre has increased the yield of oats an average of 30 bushels per acre during the past three years. Fall applications of phosphorus and potash have not resulted in higher yields. However, in previous years the soil on which the tests were conducted received applications of superphosphate and potash. Nitrogen applied in the fall is less efficient in increasing grain yields than that which is applied in the spring. Nitrogen applied in the fall is effective in increasing forage production. Fall and spring applications of nitrogen are recommended if the oats are grown for grazing and grain. On soils not adequately supplied with phosphorus and potash apply 300 pounds per acre of a 4-8-8, 6-8-8 or 8-8-8 before planting and top-dress with 30 pounds of nitrogen in the spring.

## **Devon Cattle Project . . . J. L. Heath, Jr. and Dawson M. Johns**

The Station has owned a small group of Devon cattle since June 1943, which has been fed and handled in ordinary farm fashion. The Devon is among the dual purpose breeds. The purpose of the project is to observe the suitability of a dual purpose breed for many farms of North Louisiana which are too small, or for other reasons, can not grow cattle especially for beef or milk purposes, but on which there is need for milk and beef to supply the family food requirements.

During the past year two Devon cows have been in production, each having produced more than sufficient milk to raise a calf weighing 450 pounds at the age of 12 months. Laborers employed by the Station used the surplus milk. More adequate interpretation can be given to the suitability of dual purpose cattle to North Louisiana conditions as the herd increases in size and as experience is gained in handling the Devon breed.

# Horticulture . . . P. L. Hawthorne

## Truck Crop Breeding Projects

The most important problem of the vegetable growers in Louisiana is finding varieties that will produce maximum yields of quality produce under local conditions. Most varieties have not been selected for southern growing conditions or for resistance to southern diseases and insects. This Station is doing breeding work to develop disease resistant varieties of edible cowpeas and watermelons. Although no new varieties are ready for release, some progress has been made. A brief description of the major problems and progress to date follows:

Edible cowpeas often fail to make normal growth under disease conditions in Louisiana. Plants mortality, caused by two soil borne troubles (cowpea wilt and nematodes) will vary from 25 to 50 per cent on a large portion of hill soils in the State. Promising hybrids that are resistant to both wilt and nematodes have been produced and are being purified and increased for further testing before being released.

The acreage of soil suited to the production of watermelons is being reduced each year due to the spread of the organism that causes watermelon wilt (*Fusarium niveum* E. F. S.). Wilt resistant varieties and strains from other experiment stations have been tested, many of which possess disease resistance, but lack other characteristics that are desirable from a commercial point of view. It is hoped that wilt-resistant strains that will meet the need of Louisiana growers will be ready for release within the next few years.

## Sweet Potato Seedling Test

The sweet potato seedling test is conducted in connection with the sweet potato breeding program at the University Station. Of the seedlings grown, the L-126 continued to be the most promising of the older strains. Two of the seedlings, grown in 1943 for the first time, that show promise of having values are L-156 and L-132. The L-156 possesses Porto Rico shape and exterior color but is superior to Porto Rico in interior color and yields. L-132 is a heavy yielding, highly colored strain that should fit into a good food and feed program.

## Fertilizer for Sweet Potatoes in North Louisiana

Outfield sweet potato fertilizer tests were located in the various commercial areas in North Louisiana. The work included five tests consisting of 12 treatments per test. A summary of the data from these experiments shows that 400 pounds of a 4-12-8 fertilizer gave most profitable results with 400 pounds of 4-8-8 second.

## Peach Fertilizer Test

Fertilizer studies on peaches conducted over a period of years show that profitable yields can be obtained from a liberal application of a 4-12-4 fertilizer. It is recommended that such fertilizer be applied at the rate of one to two pounds per year's age of the tree.

Plant mortality of trees in the test has been high in plots receiving no fertilizer and plots receiving a small amount of fertilizer in comparison to highly fertilized trees. This indicates that the life expectancy of a highly fertilized orchard is longer than one handled under poor fertilizer practices.

## Production Satisfactory with Simplified Feeding — plus Green Feed . . . C. W. Upp, J. L. Heath and D. L. Johns

The results of the feeding tests at the North La. Experiment Station for the past two years demonstrate emphatically the value of good green feed for laying hens. Two rather small yards per house have provided an adequate supply of green feed at most seasons of the year. In one yard bermuda grass and lespedeza provided most of the green feed during the summer and fall and in the other yard rye grass was the green feed for winter and spring.

The relatively simple rations used yielded good egg production when supplemented with the green feeds mentioned above. The pen fed mash with soybean meal as the only protein ingredient averaged 148.4 eggs per hen in ten months, and the pen with only cottonseed meal as a protein source averaged 149.5 eggs per hen. As a matter of fact, the hens in these two pens laid slightly better than the pen fed a complex mash (i.e., with several protein ingredients) — 143.4 eggs per hen. The pen fed a 32% supplement and scratch grain "free choice" was moved March 1 and kept for 3 months in a pen without rye grass. The average production for ten months in this pen was 134.6 eggs although up to the time they were moved the hens in this pen averaged within half a dozen eggs of those in the other pens.

The hens with free choice feeding consumed slightly more feed per hen, but their diet had a lower protein content. The body weight of the hens in the "free choice" pen held up better during the summer than that of the hens in the other pens. There was not much difference in the efficiency with which the feed was utilized. It varied from 6.6 lbs. (per dozen eggs produced) in the cottonseed meal pen to 7.7 lbs in the free choice or protein supplement and grain pen.

Little difference existed from pen to pen in the size of the eggs laid, varying from 24.8 oz. per doz. in the soybean meal pen to 25.7 oz.



per doz. in the supplement-grain or free choice pen. Broodiness was much less frequent in the 32% supplement and grain or free choice pen than in the others. Whether or not this was coincidental is not known. The hatchability of fertile eggs was quite satisfactory in all pens, although fertility was rather low. The fertile eggs in the cotton-seed meal pen hatched 5 to 8% lower than for the other pens, although hatchability averaged 77.2% in this pen.

## **Turkey Production in North Louisiana . . . C. W. Upp, J. L. Heath and D. M. Johns**

Many more turkeys are consumed in Louisiana each year than are grown in the state. The increased production of turkeys under range conditions appears to be feasible, in the hill sections of the state. A project involving the production of market turkeys, with studies outlined re-rations, costs of production and methods of management, has been started at the North Louisiana Experiment Station this year. Two colony brooder houses and range shelters are being constructed. The poult's will be hatched in April.

## **Poultry Houses in North Louisiana . . . C. W. Upp, J. L. Heath and D. L. Johns**

Temperature and humidity records have been maintained for four 10' x 12' colony houses of different wall and floor construction since they were built in 1942. The number one house has a standard concrete floor (i.e., about 2-½" thick and filled underneath so it is 10"-12" above ground level with building paper underneath the concrete) and has 12" boxing and 3" batten sidewalls. The number two house has stuffed hay walls and pine pole frames. Poultry netting is nailed to each side of the poles to afford a wall 4 to 6 inches thick. This house requires rather frequent repairing and for this reason is not liked by the caretakers. The floor in this house now is dirt-cement construction and is entirely satisfactory after sixteen months use. The third house has sidewalls of sawmill slabs, on pine pole frame. The walls are chinked with clay and require minor repairs each year. This house has given completely satisfactory service for about 2-½ years. The light-weight concrete floor 1-¼ — 1-½ inches thick on well tamped soil has been in use now for fifteen months and is in very good condition. House number four has sidewalls of shiplap placed horizontally and has a double thickness wooden floor with building paper between the two layers. This house has the most variable temperature of the four. It is coldest in winter and hottest in summer.

The temperature records when charted revealed some interesting trends. In general the "minimum" temperatures as recorded for the Weather Bureau at the Experiment Station average 2 - 3 degrees lower in the winter than the 7:00 A. M. temperatures in the poultry houses. During the spring and summer the weather Bureau minimums average 3 - 7 degrees lower than the 7:00 A. M. temperatures in the experimental houses. During the winter and spring months the 3:00 P. M. temperatures in the houses are lower than the Weather Bureau "maximum" observations, except for the shiplap house which heats up quickly and cools off quickly. In the summer the "straw" and "slab" houses at 3:00 P. M. are 2 - 3 degrees cooler than the Weather Bureau maximum readings. The "shiplap" and "boxing and batten" houses on the other hand average as high or higher than the Weather Bureau "maximums". The daily range in temperature in the houses varies from 10 to 20 degrees depending upon outside temperatures. The house temperatures fluctuate quite consistently with Weather Bureau readings, although sudden changes in temperature cause some variations.

Considering the cost of construction, comfort for birds and need of repair the houses may be ranked as follows to date: Cost of construction, straw, first (i.e., lowest), slab second, shiplap third and boxing & batten fourth. Comfort for birds, slab first (best), straw second, boxing & batten third, shiplap fourth. Need of repair, boxing & batten first (least repair), shiplap second, slab third and straw fourth. Final judgment as to the comparative value of the houses must be reserved until the durability or years of useful "life" is determined. All of them have given good service to date.

## **Hogging off Corn and Sweet Potatoes at the North Louisiana Station . . .** Chas. I. Bray, Dawson Johns, and J. L. Heath, Jr.

Fourteen purebred sows and barrows were grazed on two acres of corn and two acres of sweet potatoes. A field of two acres was planted to peanuts but due to dry weather the peanut crop was a failure. The corn made 340 pounds of gain per acre and the sweet potatoes 236 pounds of gain per acre. Valuing the gain produced at 12c per pound the feed crops produced approximately \$29.94 worth of pork per acre after deducting the cost of protein supplement.

## **Calhoun Dairy Project . . .** D. M. Seath and D. M. Johns

Fifteen purebred and grade Jersey cows at the North Louisiana Experiment Station produced during 1944 an average of 7113 pounds

of milk and 356 pounds of butterfat. This butterfat average was almost identical to that secured in 1943, and was particularly creditable in view of the labor shortage, which necessitated numerous changes in the personnel handling the herd. This labor shortage also prevented the planting of the silage crop in 1944, thus causing the omission of this succulent feed during winter months. Some home grown-alfalfa hay was available for winter feeding for the first time. This was produced on a 4-acre tract of the dairy unit from a planting made in the fall of 1943. A thoroughly prepared seed-bed, including heavy fertilization of lime, phosphate, and potash, preceded the planting. The seed-bed was also firmly packed. Most of the area showed a good stand of alfalfa.

Oats and sudan grass were used as supplementary pastures to fill in periods when the improved permanent pasture was less productive. Two fields were used for this purpose with the sudan following the oats on the same fields. Different planting dates for oats were tried in the fall of 1944. A planting made on August 15th failed to produce a stand because of hot dry weather. Another field planted on September 7th produced a good stand, which was ready for grazing earlier than had been the case from October plantings.

## **Northeast Louisiana Experiment Station, St. Joseph** ... C. B. Haddon, Superintendent

### **Maintaining Profitable Yields of Cotton on Delta Soils**

At this station a number of tests have been carried on to determine the most efficient and profitable method of maintaining high yields of cotton. Some of these tests have been conducted continuously, on the same plots, for a period of fifteen years. Cotton has been grown on the plots without any rotation and no soil building practices used except as stated. Results from two of these experiments are given below.

	Average Yield 1st 5 Years	Average Yield 2nd 5 Years	Average Yield 3rd 5 Years
Check, no fertilizer 30 lbs. Nitrogen	1583 lbs. 1985 lbs.	1476 lbs. 2088 lbs.	1311 lbs. 1830 lbs.
Check, no legume Vetch annually	1089 lbs. 2044 lbs.	865 lbs. 1956 lbs.	866 lbs. 1960 lbs.

It will be noted that, while there has been a steady decline in yields from the check plots, the plots fertilized or planted to a winter legume annually have maintained a fairly high level of production.

Another test along the same line has been conducted only ten years but the same trend will be noted. In this case cotton follows corn each year. The "check" plot in this case was corn grown alone and the improved plot was corn interplanted with soy beans. The corn stalks in the first case and the corn and beans in the second are all turned under in fall after the corn is harvested. The yields of cotton are given below.

	Average Yield 1st 5 Years	Average Yield 2nd 5 Years
Cotton following Corn alone	1097 lbs.	945 lbs.
Cotton following Corn and Soybeans	2065 lbs.	2058 lbs.

It will be seen that, while production has been low and tending downward on the check, the yield following corn interplanted with beans has been maintained at a fairly high level during the ten year period.

### Control of Boll Weevil and Cotton Aphid

In dusting cotton for control of boll weevil it is very important that measures be taken to prevent a build-up of cotton aphid. In some years this little insect increases to the point that it does as much damage as the weevil would have done if no control measures had been taken. Tests have been conducted at the station for the past four years to determine the most effective control of both pests at the same time. In this work one series of plots is not dusted, others are dusted with calcium arsenate alone and a third series dusted with calcium arsenate to which various nicotine carrying materials have been added. The results of this work are shown below.

	Yield 1941	Yield 1942	Yield 1943	Yield 1944	4 Yr. Av. Yield	Av. Aphids per Sq. In. leaf surface
Check No Dust	1270	3964	3868	3354	3114	5.20
Cal. Ars. Alone	1258	3780	3539	3293	2968	13.19
Cal. Ars. Nicotine	1674	4040	4134	3684	3383	2.07

As will be seen from the above table, very effective aphid control can be had by using a combination dust. In addition to any differences in yields of cotton a very much better grade is obtained from the plots where the aphid is controlled.



## Increasing Corn Yields on Delta Farms

Notwithstanding the natural fertility of most Delta soils the yields of corn on the average farm remain very low. There are many reasons why this is true, two being the use of low yielding varieties and improper fertilization. At the Northeast Louisiana Experiment Station fairly high yields have been obtained<sup>1</sup> year after year where highly productive hybrids or varieties have been used and moderate application of nitrogen fertilizers made at the proper time. In the fertilizer work the applications are made at a rate to give 30 lbs. of nitrogen per acre and applied about the time the corn is 6 to 8 inches high. The following results have been obtained in this work:

Check, no fertilizer, yield 38.35 bus. per acre, average for 10 years  
30 lbs. nitrogen, yield 50.49 bus. per acre, average for 10 years  
Average increase from use of fertilizer, 12.14 bushels per acre.

In the variety tests, the following results have been obtained:

3 La. hybrid strains, yield 61.6 bus. per acre, average 3 years  
3 best open-pollinated varieties, 53.1 bus. per acre, average 3 years  
3 low producing open-pollinated varieties, 39.6 bus per acre.

The above results show a loss, due entirely to variety, of 22.0 bushels per acre between the La. hybrid strains and the low producing varieties. Between the high and low producing open pollinated varieties a difference of 13.5 bushels is shown. All varieties are cultivated and fertilized alike.

**Rice Experiment Station, Crowley<sup>1</sup>** . . . J. Mitchell  
Jenkins, Superintendent

## CULTURE

### Fertilizer Experiments

Included in the fertilizer experiments were: (1) Complete fertilizer with three sources of phosphorus; (2) Straw with and without fertilizer; (3) Rates and Method of application; and (4) Complete and incomplete fertilizers.

### Sources of Phosphorous

This experiment was conducted with rice grown in alternate years on land rotating every four years with a like area that had been devoted to an improved pasture for four consecutive years. The same fertilizers were also applied in alternate years to the plots devoted to improved pasture. The beneficial effect from the improved pasture

<sup>1</sup> Cooperative experiments with the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

is indicated by the rather high 7-year average yield, of 55.6 bushels per acre, from the check plots.

The 7-year average (1937-1944 less 1940) yield of rice for T.V.A. treble superphosphate was 70.5 bushels, for T.V.A. fused phosphate 69.4 bushels, and bone meal 67.1 bushels per acre. In the order listed, the increase in yields as compared to the check plots was 14.9, 13.8, and 11.5 bushels per acre. These results indicate that the three sources of phosphorous were about equally good.

### **Effect of Straw with and without Fertilizer**

The 6-year (1938-1944 less 1940) average increase in yield of rice grown in alternate years, following straw alone, was 5.5 bushels, and the 7-year (1937-1944 less 1940) average yield following straw plus fertilizer, was 13.7 bushels per acre. The 7-year average yield of the check plots was 49.2 bushels per acre.

The 6-year (1938-1944 less 1940) average increase in yield of rice, on land cropped each year, following straw plus fertilizer, was 16.1 bushels per acre. The 6-year average yield of the check plots was 41.0 bushels per acre.

### **Rate and Method of Application**

Four fertilizers, including 8-0-0, 0-10-0, 8-10-0, and 8-10-6, each were applied at the rate of 100, 200, and 300 pounds per acre on the water 8 weeks after submergence.

In 1944, for the 100-pound rate, the highest average yield of rice was 45.8 bushels from the 8-10-6 formula, for the 200-pound rate 54.3 bushels from the 8-10-6 formula, and for the 300-pound rate 60.2 bushels per acre also from the 8-10-6 formula. The average increases in yield for this fertilizer, at the rates applied and in the order listed, were 9.9, 15.9, and 19.0 bushels per acre. At each rate of application, the 8-10-6 fertilizer gave the highest 5-year (1939-1944 less 1940) average yields. The average increases for this formula, applied at the rate of 200 and 300 pounds per acre, were 4.1 and 4.5 bushels more per acre than for the 100-pound rate. In average yield, the 8-10-0 and 0-10-0 formulas ranked second and third.

In 1944, the application of 200 pounds per acre of an 8-10-6 fertilizer with the seed and 200 pounds 8 weeks after submergence produced 10.0 bushels more per acre than when the total amount was applied with the seed. In the 5-year period (1939-1944 less 1940), the average increase in yield for the split application was 8.3 bushels more per acre than when the total amount was applied with the seed. The average yield from the check plots during this period was 51.1 bushels per acre.

## Complete and Incomplete Fertilizers

Thirteen fertilizers, in which the formulas ranged from 0 to 12 percent of nitrogen, 0 to 15 per cent phosphate, and 0 to 9 percent potash, were applied with the seed at the rate of 200 pounds per acre. In 1944, the highest average yields were 42.8 bushels from the 8-10-9 and 8-10-6 formulas, 40.3 bushels from the 8-15-6 formula, and 38.8 bushels per acre from the 12-10-6 formula. The highest 5-year (1939-1944 less 1940) average increases in yields were 7.3 bushels from the 8-10-6 formula, 7.0 bushels from the 12-10-6 formula, 6.7 bushels from the 8-5-6 formula, and 6.1 bushels per acre from the 8-0-0 formula.

## ROTATION EXPERIMENTS

### Two-Year

In 1944, the highest average rice yields were following red clover on rice stubble, clean summer fallow and *Crotalaria spectabilis*. The crop or treatment that alternated with rice and the 10-year (1934-1944 less 1940) average rice yields were as follows: red clover on rice stubble 47.0 bushels; Italian rye grass on rice stubble 46.7 bushels; clean summer fallow 45.9 bushels, Barchet soybeans followed in fall by Bur clover 45.8 bushels; native pasture 44.7 bushels; *Crotalaria spectabilis* 44.5; cotton dusted with calcium arsenate until 1941, replaced in 1942 by oats and Alyce clover 34.6 bushels per acre.

### Ten-Year

In this rotation 5 consecutive rice crops are grown following 5 consecutive years in cotton, in corn and soybeans, in native pasture and in native pasture supplemented with clovers and lespedeza. No fertilizers were applied to either crop.

The rice yields in 1944 following 5 consecutive years of the above mentioned treatments were: 35.3, 44.8, 51.5 and 58.7 bushels per acre, respectively.

## RESIDUAL EFFECT OF CALCIUM ARSENATE ON RICE YIELDS

The 9-year (1935-1944 less 1940) average yield of rice following dusted cotton was 29.7 bushels, cotton not dusted with calcium arsenate to control the boll weevil 41.1 bushels, and following native pasture 37.7 bushels per acre. Since 1941, cotton has not been grown, but the length of the residual effect of calcium arsenate on rice yields is to be determined by growing rice in alternate years on the plots previously dusted.

## OATS

### Varieties

In 1943-44, eight oat varieties were grown in replicated field plots, and included Alber, Louisiana No. 517, Ventura, Camellia Berger, Victorgrain, C. I. No. 3720 and C. I. No. 3955. The highest average yield of 52.6 bushels was from Victorgrain, with Berger (49.2 bushels), Louisiana No. 517 (47.9 bushels) and C.I. No. 3955 (47.6 bushels) ranking second, third, and fourth, respectively. The lowest average yield, of 43.1 bushels, was from C. I. No. 3720.

### Fertilizer Experiment

In the fertilizer experiment, the highest average yield of oats was 37 bushels per acre from the plots that received only a top-dressing of 150 pounds of Nitrate of Soda, or 18.3 bushels more than the check. The yields from plots that received a complete fertilizer at seeding time and a top-dressing of 100 pounds of Nitrate of Soda, and those that received 200 pounds of a 4-12-4 as a top-dressing, ranked second and third respectively. The lowest yield, 22.3 bushels per acre, was from the plots that received fertilizer only at seeding time, or 3.6 bushels above the yield from the check plots.

## Rice Varietal Improvement . . . N. E. Jodon

### Preliminary Steps in Production of New Varieties

Many changeable conditions, such as new harvesting methods, new diseases or races of old diseases, different processing methods, and varying trade requirements must be anticipated in the rice breeding program. To have available a wide range of material for selection purposes, a number of crosses are made each year. True breeding selections are isolated in due course, first from individual plants and then from individual rows representing selected plants. Selections which embody combinations of desirable characters are then tested in small nursery experiments, and preliminary data on plant type, yield, and milling and cooking qualities are recorded. The better selections are then grown in field plot and outfield tests, and supplied to other experiment stations for testing.

Paralleling the more advanced testing, repurification is carried on in order to have pure seed available of varieties that prove good enough to place in the hands of growers for field trials. A period of 12 to 15 years is usually required to produce, test and start a new variety into commercial production.

### Field Yields of Rice Varieties

The average yields of standard promising new rice varieties grown in field plot and nursery tests from 1941 to 1944, inclusive, are given



below. Eight experiments were averaged in the early group, seven in the midseason group, and ten in the late group. The varieties within each group are listed in order of maturity, so far as possible. Milling quality, as indicated by average results of shelling tests (courtesy Federal-State Grading Office), are also given as pounds Total and pounds Head Rice per barrel of 162 pounds.

Cross or Variety	C. I. No.	Bus. per Acre	Milling Quality (Smith Shelling Test) Total (Lbs. per Bbl.)	Head (Lbs. per Bbl.)
EARLY				
Colusa x Blue Rose*	8323	37.7	113	97
Early Prolific	5883	34.0	110	92
Improved Blue Rose x Fortuna* <sup>1</sup>	8318	34.4	112	93
Zenith	7787	36.3	110	90
Prelude (Improved Blue Rose x Fortuna)	8311	36.7	107	76
MIDSEASON				
Bluebonnet* (Rexoro x Fortuna)	8322	38.1	110	64
Kamrose*	8314	45.0	112	99
Fortuna	1344	38.0	110	73
Nira	2702	39.7	108	64
Iola x Blue Rose, AL 5-30 <sup>1</sup>	—	42.7	108	90
Improved Blue Rose	2128	42.1	112	98
Blue Rose 41 * <sup>1</sup>	8317	43.8	110	97
LATE				
Texas Patna* (Rexoro x C. I. 5094)	8321	37.8	109	73
Delrex* (Rexoro x Delitus) <sup>1</sup>	8320	41.9	109	75
Rexoro	1779	37.0	109	71

\*New varieties of which seed has been distributed to growers by the Rice Experiment Station.

<sup>1</sup> New varieties selected at the Rice Experiment Station.

# *United States Department of Agriculture*



## **BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE**

### **The Problems of Controlling Insects on Cole Crops Under Wartime Conditions . . . C. E. Smith**

During the last three years the supplies of certain essential insecticides, especially rotenone and pyrethrum, used in controlling insects that feed upon cabbage, cauliflower, turnips and related crops, have become critically scarce because of wartime shipping conditions and the fact that our enemies had control of production of some of these materials. Consequently, during 1944, as was done in 1943, particular emphasis was placed on research to develop substitutes for these scarce materials, and to determine the possibility of reducing the recommended dosages necessary by the use of adjuvants.

### **DDT Effective Against Cabbage Caterpillars . . .**

P. K. Harrison and O. T. Deen

During 1944 the studies on the control of the principal species of cabbage caterpillars—the imported cabbageworm, the cabbage looper and the larva of the diamondback moth—were devoted primarily to substitutes, reduced dosages and adjuvants for rotenone and pyrethrum.

Continuing the study of DDT (dichloro-diphenyltrichloroethane), the very promising insecticide on which a preliminary report was made in the last annual report of the Experiment Station, very outstanding results were obtained in two experiments against the green cabbage caterpillars feeding on cabbage.

Three dilutions of DDT—1.0 percent, 3.0 percent and 5.0 percent—were applied weekly, bi-weekly and tri-weekly to cabbage for the control of these caterpillars. It was found that these dilutions could be used effectively as substitutes for rotenone and pyrethrum in combatting these cabbage caterpillars, and in fact were superior to them. There were no significant differences in yield of marketable cabbage in the fall experiment between 1.0 percent, 3.0 percent and 5.0 percent dilutions applied weekly, bi-weekly and tri-weekly. The only differ-

ence in yield of marketable cabbage in the spring experiment, in which only the 1.0 percent and 3.0 percent dilutions were used, was in the 1.0 percent treatments; the weekly and bi-weekly applications were superior to the tri-weekly applications. All dilutions of DDT applied at the three intervals were superior to 0.75 percent rotenone.

DDT will probably not be available for agricultural use until after the war, as all the supplies of this material, with the exception of small quantities for experimental purposes, are being used by the armed forces.

## **Nicotine Can Be Substituted for Rotenone in Controlling the Turnip Aphid . . .** O. T. Deen, P. K. Harrison and K. L. Cockerham

Nicotine sulphate has been used for many years for the control of the turnip aphid, but was not entirely satisfactory under some weather conditions, especially at low temperatures. But several years prior to the war rotenone had been found superior to nicotine sulphate and was recommended for controlling the turnip aphid. Investigations were begun in 1943 and continued through 1944 to develop a satisfactory substitute for rotenone that could be used by home and victory gardeners, as well as by commercial growers, for the control of the turnip aphid. In the experiments thus far nicotine has proven to be an effective insecticide against this pest. Free nicotine, however, has proven to be more effective than nicotine sulphate under all weather conditions. Experiments with mixtures of nicotine and DDT are being conducted with the purpose of developing a satisfactory control for this insect and other species that feed on turnips, mustard and related crops.

## **Sweet Potato Weevil Investigations . . .** K. L. Cockerham and O. T. Deen

The sweetpotato weevil research project was established in Louisiana in October, 1937 as a companion project of the weevil control and eradication project located at Gulfport, Miss., which was attempting to eradicate or control the weevil in certain areas of the South. The main objectives of the research project were: (1) To study the biology of the weevil, with special reference to such of its habits as

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<sup>1</sup> This part of the work was conducted by the Division of Control Investigations.

might have a direct bearing upon the control program; (2) To determine the practicability of controlling the weevil by the application of insecticides; and (3)<sup>1</sup> The development of methods of fumigating or otherwise treating sweetpotatoes to destroy the weevil. Later, the improvement of cultural control methods was added to the list of objectives.

### **Biological Investigations**

Biological studies revealed data on the weevil that were not previously known. Development in stored potatoes was found to be much slower during the low, winter temperatures than formerly believed. It was found that a small percent of adults, ranging from 0.2 percent to 1.0 percent, could live over the winter months in fields and headlands without food, one female in one experiment cage living 144 days. Adults were taken in flight 1¼ miles from point of dispersal. Weevils were observed breeding in 17 species of wild and ornamental plants, all of the genus *Ipomoea*, and feeding to some extent upon 14 additional plants of other genera. Three species of parasites were discovered preying upon weevils at Baton Rouge and/or Sunset.

### **Insecticide Investigations**

Insecticide experiments have shown that the adult weevil is readily killed by the arsenicals, but their practical application in the field has not been proven. This is due to the long period of time over which weevils may enter fields, and to their preference for potatoes instead of vines, which become accessible through soil cracking or other exposure.

The best field treatment found was calcium arsenate applied at bi-weekly intervals throughout the season, which yielded 560 pounds more non-infested potatoes per acre in 1944 than the untreated check. Calcium arsenate, potassium fluosilicate and sodium fluosilicate caused foliage injury, but apparently did not reduce the yield. A poisoned bait consisting of ground sweetpotatoes and Paris green is effective against adults around storage houses and seed beds after these have been thoroughly cleaned up. A method of fumigating stored potatoes with methyl bromide was worked out and is now being used.

### **Utilization of Cultural Practices for Controlling the Sweetpotato Weevil**

Cultural practices, rotation and sanitary measures are being used to excellent advantage in the Louisiana commercial sweetpotato area



and in eradication zones in several southern states. Considerable attention has been directed toward the improvement of these methods and during the 1944 harvesting season, special efforts were directed toward improving the harvesting methods. Vine cutters and potato diggers were tried on several farms and these trials indicated that both vine removers and mechanical diggers can be made practical and that the fields will be left much cleaner after their use. All potatoes are left on the surface and are much more accessible to the pickers, which speeds up the process. The use of vine cutters alone also speeds up harvesting and leaves the rows cleaner so that less potatoes are covered and left in the fields. Winter plowing or disking of sweetpotato fields is effective in the destruction and elimination of green vines and potatoes. Trials during the past two years indicate that disking is much faster and more economical than plowing.

### **Bee Culture Investigations**

The Southern States Bee Culture Laboratory, a field station of the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture, was established cooperatively with the Louisiana State University in 1928 and is concerned with beekeeping problems common to the Southern States. This report deals with certain phases of research problems which apply particularly to Louisiana.

## **Pollen-Trap Records and Pollination . . . Warren Whitcomb, Jr.**

The value of the honeybee as a pollinating agent, and as an essential factor in agriculture for the production of seed or fruit, is only partially realized. Pollen, the male element of flowers, is used by the bees as a protein food, and it is estimated that an average colony may use 40 pounds in one year. In searching for nectar and gathering pollen for its own uses, the honeybee carries pollen from one blossom to another, and thereby effects fertilization and seed production. When bees are made to enter and leave the hive through a screen, called a pollen trap, it is possible to remove pellets of pollen from their legs. In most cases, however, enough pollen is carried through the trap so that the colony can maintain itself although brood production may be somewhat curtailed.

During 1944 pollen traps were placed on hives, and daily records of trapped pollen were taken. Average yields from several colonies for 10-day periods are as follows:

Period	Grams	Period	Grams
Jan. 6 - 16	3.3	June 5 - 14	162.3
17 - 26	190.3	15 - 24	132.3
27 - Feb. 5	873.2	25 - July 4	143.0
Feb. 6 - 15	351.3	July 5 - 14	370.3
16 - 25	1030.7	15 - 24	511.7
26 - Mar. 6	597.4	25 - Aug. 3	303.3
Mar. 7 - 16	353.1	Aug. 4 - 13	263.0
17 - 26	504.0	14 - 23	922.0
27 - Apr. 5	214.5	24 - Sept. 2	945.7
Apr. 6 - 15	655.7	Sept. 3 - 12	Traps off
16 - 25	549.8	13 - 22	126.3
26 - May 5	510.8	23 - Oct. 2	362.7
May 5 - 15	508.8	Oct. 3 - 12	538.3
16 - 25	347.3	13 - 22	246.3
26 - June 4	280.3	23 - Nov. 1	190.7
		Nov. 2 - 11	103.0
		12 - 13	24.0

From these data some idea of the value of the honeybee as a pollinating agent can be obtained. If these colonies used 40 pounds of pollen during the year for maintenance, in addition to the 25 pounds removed by the traps, a total of 65 pounds of pollen was gathered. While pollen pellets from the legs of bees vary greatly in size and weight, on an average there are 72,500 pellets in a pound. In gathering a load of pollen, bees have been observed to visit 84 pear blossoms, 100 dandelion heads, 346 red clover florets, or 357 alfalfa florets. This would give an average of 220 flowers visited for each bee load (2 pellets). Therefore, for each pound of pollen gathered about 8 million flowers were visited and fertilized, and for the estimated 65 pounds of pollen gathered by each colony during the year about 520 million blossoms received free pollination service. This would be equivalent to the fertilization of 1.3 acres of red clover or 2.4 acres of alsike or white clover. Since the service is spread throughout the year the value of the honeybee to crops is seen to be immense. Louisiana, according to census figures, has one colony of bees for each 438 acres of farm land, which is wholly inadequate for the pollination needs of the State.

## Scale Colonies and Honey Production . . . E. Oertel

A colony of bees on a scale can be used to indicate the value of the area for beekeeping. A representative scale colony that is weighed at the same time each day reflects apiary conditions. Among other things it shows when the honey flow begins and stops, how much nectar is brought in daily, and how much of the stores is being used in the winter or at other times when nectar is not available.

The honey production per colony of bees in Louisiana is estimated as from 30 to 35 pounds per year. Table 1 gives the average scale-colony gains and losses in weight for various places in the State. The figures indicate that most of the honey is obtained in April, May, June, July, and October, that losses in weight occur in January, February, November, and December, and that either losses or gains can be expected in March, August, and September. However, the gain or loss in any one month may fluctuate widely. For example, the average colony surplus at Baton Rouge was 265 pounds in 1943, and 140 pounds in 1944. On the basis of the scale-colony gains, honey production in the State can be greatly increased through wider use of approved beekeeping practices.

TABLE 1 — Average gains (+) and losses(—) in weight (in pounds) of colonies of bees on scales at different places in Louisiana.

Month	Luling (1931-41)	Donaldsonville <sup>1</sup> (1930-41)	Baton Rouge <sup>2</sup> (1935-41)	Baton Rouge <sup>2</sup> (1929-44)	Shreveport <sup>3</sup> (1943-44)	Tallulah <sup>4</sup> (1938-44)
Jan.	-11	-10	-5	-6	-5	-7
Feb.	-12	-8.5	-6	-8	-9	-10
Mar.	+2.5	+8	6	-3	-16	-20
Apr.	+24	28	43	40	9	7
May	44	32	47	43	20	42
June	41	12	10	16	15	47
July	35	15	10	13	15	42
Aug.	8	0	-8	-4	-10	-4
Sept.	3.5	-5	-9	-11	20	18
Oct.	26	41	14	18	0	20
Nov.	-10	-11	-8	-8	-4	-8
Dec.	-9	-6	-4	-5	-7	-9
Calculated surplus	142	95	90	85	28	118

## Controlled Mating . . . Otto Mackensen

In the honeybee desired matings can be obtained either by artificial insemination or by isolation. During the past season some progress has been made in the use of both methods. In previous years egg laying by artificially inseminated queens was greatly delayed, but now the interval between insemination and egg laying is approximately the same as with naturally mated queens. By inseminating with 2.5 cubic millimeters of semen two to four times at 48-hour intervals during the first 10 days after emergence, the interval from emergence to first eggs has been reduced from 37 or more days to about 15 days.

<sup>1</sup> Location overstocked after 1935 because of queen rearing and mating colonies.

<sup>2</sup> Separate locations about 4 miles apart.

<sup>3</sup> Colonies located outside the city produce much larger honey crops.

<sup>4</sup> Figures for November to March incomplete.

Queens mated by this method have greater vitality, because a long nonproductive period, during which the queen is usually mistreated by the worker bees, is avoided.

Matings at isolated stations were more successful in 1944 than ever before. In the spring a group of queens were mated to selected drones at the Louisiana State University Marine Biological Laboratory, at Grand Isle, La., and shipped north for a test. The reliability of this location was tested later in the season, when queens and drones of an extremely yellow inbred stock were mated there. Since all native drones are darker than those of the yellow stock used, and since artificial crosses between this yellow stock and darker drones have always produced intermediate hybrids, any mismating with native drones in the neighborhood of the mating station would be recognizable by the production of darker-than-usual workers. Since the 34 laying queens obtained all produced yellow worker progeny, as expected, it was concluded that no wild drones were within flight range. Similar tests of other stations previously used had revealed from 41 to 66 per cent mismating. There are other islands along the Texas and Louisiana coast which probably would provide similar isolation and could be used by commercial queen breeders to improve their control over matings.



## **BUREAU OF PLANT INDUSTRY, SOILS AND AGRICULTURAL ENGINEERING**

### **Irish Potato Breeding . . . E. L. LeClerc**

The cooperative Federal-State Irish potato breeding program to serve Louisiana and the other Southern States was started in 1939. The investigations under way include studies of certain potato diseases with special reference to breeding for disease resistance. An important part of this breeding program is the growing of new seedlings for distribution to collaborators in the Southern States who make further selection of those seedlings that proved best adapted to their conditions.

#### **Non-Virus Leaf Roll in the Field**

A study has been made of a non-virus leaf roll of potato, which is similar in appearance to virus leaf roll, and which often occurs under southern conditions. In some varieties only the lower leaves roll, whereas in others the rolling may also extend to the upper leaves. The extent of rolling varies from a slight cupping to a tightly rolled



condition. (See photograph). Such rolled leaves do not possess the brittleness of those on plants infected with virus leaf roll, and yielding ability appears not to be materially affected by this type of rolling. The factors favoring the expression of this type of leaf roll are not completely understood. However, the data indicate that it is a heritable character. It is probable that the expression is conditioned by environmental factors and the interaction of length of storage period and rest period.

Marked differences in the degree of rolling were found in seedlings and named varieties. A few of the varieties tested were relatively free from or not subject to this rolling. (See photograph). This indicates that it should be possible to select seedlings that are free from non-virus leaf roll and to combine freedom from rolling with other desirable characters.



Severe type of non-virus leaf roll in an unnamed potato seedling variety.



### Genetic Leaf Roll of Potato Seedlings

A leaf roll of small seedlings grown from true seed in 3-inch pots in the greenhouse has recently been observed. The margins of the leaves of these plants roll upward, starting with the lower leaves and extending to the apical leaves (see photograph). Many of the rolled leaves take on a reddish-purplish tinge along the margins shortly after rolling becomes apparent.

Stem-graft inoculations were all negative, indicating that the cause of the rolling was not of a virus nature. Plants grown in the field from tubers produced by plants subject to rolling did not show any type of leaf rolling. This is further evidence that a virus is not associated with this type of rolling.

The rolling was first observed in and inbred progeny of a seedling variety. Similar rolling occurred in most progenies where this seedling



An unnamed potato seedling variety which is not subject to non-virus leafroll.



Genetic leaf roll of small Irish potato seedlings. Non-affected plant in the middle.

variety was used as a parent. Therefore, this type of leaf rolling is the result of the expression of a genetic character.

Since rolling does not occur, under field conditions, in plants grown from tubers of affected plants, it appears that this type of leaf roll is different from the non-virus leaf roll discussed above.

#### **Effect of Virus Leaf Roll and Spindle Tuber on Yield**

Experiments were made to determine the effect of 4, 8, 12, 16, 24, 32, and 100 per cent of virus leaf roll and of spindle tuber on yield of Katahdin and Triumph potatoes in Louisiana. These experiments have been made for three years and indicate a trend for a progressive decrease in yield as the amount of either disease increased. The reduction in yield at 4 and 8 per cent of either leaf roll or spindle tuber was relatively small from the standpoint of the commercial grower. Thus, a small amount of either of these diseases in the commercially grown crop for table stock in Louisiana would not materially reduce the yield of marketable tubers.

#### **New Potato Varieties**

During the past several years a number of new varieties of Irish potatoes have been released. Yield tests have been made of these new introductions at Baton Rouge each year in order to have some information as to their yielding ability in Louisiana. Some of these new varieties are Erie, Pawnee, Mohawk, Kasota, Potomac, and Menominee.

All the above named varieties, except Menominee, have been tested for yield at least one year and most of them two years. None has yielded as well as either Katahdin or Triumph in these preliminary



tests and therefore no recommendation for planting in Louisiana can be made at present.

### **Adaptability of New Seedling Varieties**

Each year selected unnamed seedling varieties are sent to most of the Southern States where they are planted for further selection. Some of these new seedling varieties are widely adapted to conditions of the Southern States and a large number are of an early-maturity type. Last season one of them showed considerable resistance to scab and 4 others were moderately resistant; all of these also possessed good yielding ability. One was found to be highly resistant to late blight in Texas and another one moderately resistant. A number of seedling varieties have been found to be resistant to early blight in Texas and Ecuador. All of these disease-resistant seedling varieties will be used for further breeding work and if some prove to be superior in yielding ability when compared with the varieties now grown commercially they will be considered for naming and release to the growers.

## **CORN HYBRIDS . . . Hugo Stoneberg**

The corn breeding program at the Louisiana Agricultural Experiment Station is conducted in cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

Several good corn hybrids adapted to the various corn-growing areas of the State have been developed. These hybrids produce 20 to 25 percent more grain than the better open-pollinated varieties.

Louisiana corn hybrids are superior to the open-pollinated varieties because: (1) they tend to have two or more ears per plant, thus making them very productive; (2) they have strong, sturdy root systems which make them resistant to lodging and to drought; (3) the plants are more resistant to insects and to disease than the varieties; and (4) their ears are covered with long, close-fitting husks, making them resistant to weevil and ear-worm damage.

During the five-year period, 1940-1944, considerable progress has been made in establishing the production of hybrid corn seed on a commercial basis. Seed production of the foundation inbred lines and single crosses is considerably more hazardous than is the case in the Corn Belt due to the lower productivity of the soil, larger insect populations and perhaps wider fluctuations in available moisture. Foundation seed production has been difficult and uncertain, therefore, except



in the case of a few outstanding inbred lines. The production of double-cross seed, however, on the vigorously growing foundation single crosses, has been very successful.

Seed of many different hybrids was produced in the early stages of the program. Now, after the better ones have been determined, seed is being produced of only a few outstanding ones. These are Louisiana Hybrids 468, 3802, 1039, 2509, 2909, and 6810. Louisiana Hybrids 468 and 3802 are white prolifics and are best adapted to the northern half of the state. They are also well suited to similar areas in Mississippi. Louisiana Hybrid 1030 involves two yellow flint lines and two white dent lines and consequently is mixed in color. This hybrid is adapted to central Louisiana and the Florida Parishes. Louisiana Hybrids 2509 and 2909 are yellow flint types and 6810 is a smooth-dent type. These hybrids are especially well adapted to the alluvial soils of southern Louisiana.

The seed production of Louisiana Hybrids has increased from year to year. In 1943, 3,000 bushels were produced by several growers in different areas of the State. In 1944 the number of production fields was increased considerably and about 8,000 bushels of seed were produced despite adverse weather conditions. This seed produced in 1944 is now available for planting. It will mean that Louisiana corn hybrids will be grown on about 64,000 acres in 1945. With an average increase of 7 bushels per acre, the total increase should amount to 448,000 bushels.

In 1943 the average increase in yield of the Louisiana corn hybrids over the open-pollinated varieties was 7.4 bushels per acre or 21.4 percent. In 1944 the average increase was 9.5 bushels or 31.9 percent.

## **COTTON DISEASES . . . D. C. Neal**

### **Seedling Diseases**

The principal seedling diseases of cotton and their importance in Louisiana are given in the biennial report of the Northeast Louisiana Experiment Station for 1941-42. In this report results of seed treatment tests conducted from 1938 to 1942 inclusive for stand improvement are indicated. Reginning, or machine delinting, followed with improved ceresan or ceresan dust treatment at standard rates is now recognized as perhaps the most practical and economical method developed thus far for treating cotton seed in this area. The method also is now widely practiced by seedsmen throughout the Mississippi Valley and most growers insist on ceresan-treated seed for planting purposes.

These tests have been continued during 1943 and 1944 as a part of the regional test C and in addition to improved cerasan, other chemicals have been used at different rates of treatment using both reginned and fuzzy seed lots. The newer chemicals which appear promising are DuBay 1452C, Spergonex, DuBay 1452F, and Dow 9. All of these gave seedling values at thinning that were significantly better than untreated seed. Dow 9, however, while yielding good results is extremely irritating to the nasal passages and will have to be modified accordingly before it can be utilized. In some of the more recent tests yields were increased by treatment and in others they were not.

**Suggestions as to studies needed:** (a) There is still interest in some areas in sulphuric acid delinting plus floatation grading and chemical dust treatment for improving stands. On January 14 an advertisement by a seedsman appeared in the Memphis Commercial Appeal bearing the caption "Acid delinted seed (sinkers)—cerasan treated — 8 or 9 pounds will plant an acre." Although we have some published data on treated-acid-graded seed obtained from the regional tests, perhaps more tests should be conducted in different parts of the belt in which acid-delinted graded and machine delinted are treated with the most effective chemical found thus far and then compared in both hill drop and drill systems of planting.

(b) In the case of volatile dusts some investigators believe that more thorough disinfection of seed is obtained if longer intervals are allowed to elapse between treating and planting. Perhaps more information along such lines would be valuable and should include seed treated following ginning and kept in storage until the second spring.

(c) Damping-off of seedling by the *Rhizoctonia* (*Corticium solani*) fungus continues a threat to good cotton stands in many sections of Louisiana. The disease also was found attacking the leaves of mature cotton plants in 1943 and again in 1944 in both Louisiana and Mississippi. Just how serious it may become in the future cannot be forecast, but it represents a challenge to pathologists and agronomists alike and experiments designed for control should be initiated. Several attacks on the problem present themselves: date of planting for less deleterious effect; seed and soil treatment; fertilizer effect; and cultural practices. (Phytopathology 34: 599-602, 1944 and 32: 641-642, 1942.)

### **Fusarium Wilt**

**Wilt resistance and breeding.** Previous work on this phase of the problem in Louisiana has been published in the Journal of the American Society of Agronomy 30: No. 8: 644-646, 1938, in the Pro-

ceedings of the Cotton Disease Council meetings for 1938 and 1940 respectively and in the 1941-42 and 1942-43 annual reports of the Louisiana Experiment Station. As a result of these studies it has been found that Delfos 425, Delfos 425-920 and Coker 100 W. R. are highly resistant and productive varieties of cotton for the wilt-infested districts of the delta parishes. Also that several strains of Dixie Triumph, Deltapine, Wanamaker S. W., Miller, and progenies selected from a hybrid, Dixie Triumph 62-75 x Deltapine 829, appear to be satisfactory for the coastal plain and certain hill lands where the disease is prevalent. The method of obtaining satisfactory resistance in the hybrid has been that of testing, roguing, and selecting over a three-year period on uniformly infested land. Selections were made of the best disease-free plants, that is, plants with good staple length and high lint percent. The better progenies were increased the past season (1944), and, as soon as they can be tested for yields, the best will be released.

**Regional cotton-wilt studies:** Phosphate-variety tests and variety N-P-K experiments in Louisiana.

For details of these experiments see *Phytopathology* 31: 796. 1941, and Proceedings of the Seventh meeting of workers on cooperative cotton-disease projects, issued September 7, 1942.

**Wilt infection technique.** Reference is made to reports published previously in the Proceedings of the Cotton Disease Council for 1938-39 and in the annual report of the Louisiana Station for 1941-42.

During the past year some infection studies were made in the field and greenhouse with wilt cultures grown on sections of Hibiscus stems and roots—the objective being to obtain not only a more satisfactory medium for inoculation but possibly more information on survival of the fungus in the soil. A preliminary study also is now in progress to determine the effects if any of filtrates and extracts of the fungus on susceptible and resistant lines. If a differential can be obtained by this approach to the wilt problem, it may be possible to determine quickly and more easily the resistance or susceptibility of varieties or strains.

**Suggestions for future work.** (a) Continue infection-technique research for the purpose of developing not only a simple, satisfactory method that may be utilized for the isolation of wilt-resistant lines but also for studies of the inheritance of wilt resistance.

(b) Continue the present breeding method of roguing and selection for resistance with other commercial varieties or strains as the occasion demands.

## Nutritional Deficiencies

### *Potassium-Magnesium*

Cotton rust due to potash hunger was prevalent in destructive form the past season especially in southcentral Louisiana. The leaf-spotting organisms, *Cercospora gossypina* and *Alternaria* sp., which accompany rust were found active and sporulating on leaves of cotton plants in several localities, resulting in almost complete defoliation by mid-July and early August.

In this area other plants also were found with leaf symptoms indicative of magnesium deficiency.

Perhaps more information is needed on potash levels, fertilizer amendments and organic matter so as to give a clearer perspective of the importance of these leaf-spotting organisms. Their role in connection with nutrient deficiencies of cotton may be greater than is now recognized.

### *Physiological Wilt*

This wilt occurred again the past season in many sections of the delta causing serious losses. It also was widely prevalent in the delta cotton sections of both Louisiana and Mississippi in 1943 to an alarming degree. In fact, many planters say that this wilt is the most serious production problem now confronting them. The trouble appears to be definitely associated with prolonged dry weather, high temperature, and unfavorable soil conditions, such as loss of organic matter and development of hardpan in the subsoil. Under these conditions of stress normal growth and metabolism of cotton plants cannot proceed and wilting results.

The cultural and soil management practises which have prevailed no doubt for long periods for cotton growing in this area, such as continuous cotton and failure to rotate with crops which supply organic matter in adequate amounts, are thought to be largely responsible for development of hardpan in these soils and subsequent cotton failure in dry seasons.

Planters are alarmed as restoration of organic matter cannot be accomplished quickly—yet, nevertheless, measures with that objective in mind, especially crops that will deepen the root zone and supply organic matter abundantly so as to conserve moisture during dry periods, appear to be the only solution to the physiological wilt problems.

## Cotton Investigations . . . John R. Cotton

Stoneville x Hopi progenies continue to show considerable promise and the better progenies are to be increased. Boll size was im-



proved by selection and other characters maintained. Some interest has been shown in these progenies as they may have some resistance to Verticillium wilt.

D. & P. L. x Dixie Triumph progenies were increased and will be tested in the coming season in comparison with older strains. The length of these progenies is better than the original selection and lint percentage has been maintained about the same as the parent selection. All of these progenies showed less than 5 per cent wilt under severe wilt conditions.

In a cooperative test, conducted with Mr. Simpson of the U. S. Cotton Field Station, Knoxville, Tennessee, it is indicated that cotton varieties become acclimated. It was found that there is less field deterioration of seed from varieties which have been grown at Baton Rouge for several years and those selected here than there was in strains of outside production.

Considerable interest has been shown in the use of flame cultivators. An experiment was started this year to get some information on the use of this type of cultivation. A test was set up using a machine supplied by the Department of Agricultural Engineering. This department also assisted in the operation of the machine.

Three treatments were used as follows: normal culture, flame alone, and flame with the middles cultivated (one trip to the row at each working).

Results of this year's test showed that the plots with the flame with middles cultivated gave slightly higher yields than the normal culture, showing that there was no ill effect from the flame. The yields of the flame alone plots were considerably lower than the normal culture but this was mostly due to lack of control of grass in the middles. The machine used could be improved by adding two or more burners to cover the middles at the same time as the drill is cleaned. It is planned to continue this work with an improved burning machine.

Work is being continued on maintenance of the selfed lines, the selfed line exchange studies, and special purpose breeding, namely, Sea Island crosses, coarse fibered strains and extra long upland strains.

## **Emergency Plant Disease Survey . . . Douglas C. Bain**

The Emergency Plant Disease Survey was started as a cooperative project of the United States Department of Agriculture in July, 1943. The object of the project was to aid in the study and control of plant diseases throughout the United States. It seemed especially important under war-time conditions to keep our food and crop production at the highest possible peak and it was thought that the work of the Plant

Disease Survey would be of value in locating diseases and disease epidemics and in determining when and what control measures should be used.

Twenty-four pathologists were assigned an average of two states each to keep close watch for the possible introduction of new plant diseases; to accumulate data as to distribution, occurrence and severity of diseases of food and crop plants; and to aid in every way possible the control and prevention of plant diseases. During 1944, a few diseases known to occur in other states were observed for the first time in Louisiana, and three undescribed diseases were found. When possible and practical, information as to control measures (such as seed treatment, spraying or dusting, etc.) was passed on to farmers and growers.

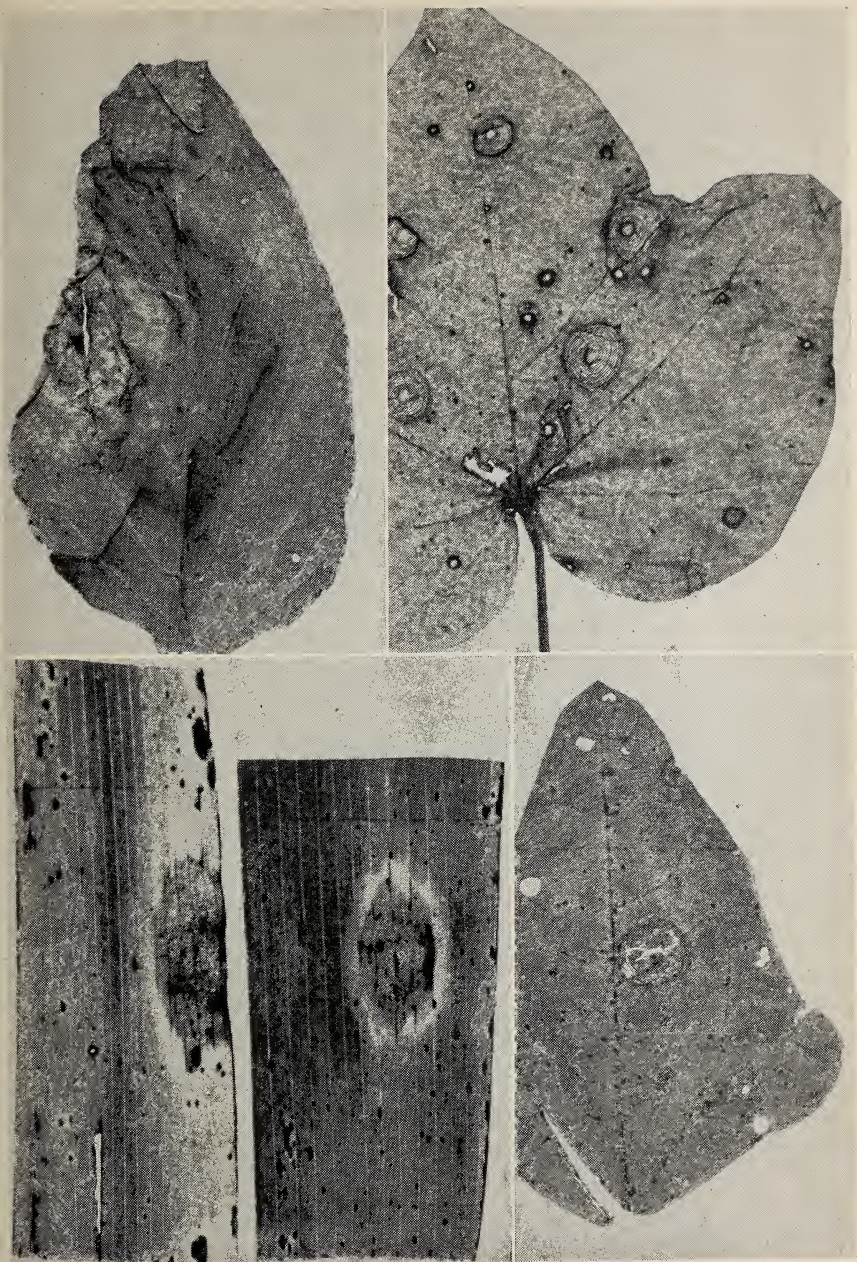
**THREE POTENTIALLY IMPORTANT DISEASES HERETOFORE NOT KNOWN TO OCCUR IN LOUISIANA.** Blight of bell pepper caused by the fungus *Phytophthora capsici* was found in one field in the vegetable area near Ponchatoula. The fungus attacks stems, leaves (see photograph), and fruit, and is capable, under favorable weather conditions, of inflicting severe damage.

Leaf spot (see photograph) of cotton, caused by the fungus *Ascochyta gossypina*, was found to be rather common in the southwestern part of the State. This disease was reported as causing considerable damage in Arkansas several years ago. In Louisiana, however, the disease was found only in areas where potassium and magnesium deficiency had left plants in such a condition as to permit the fungus to spread extensively.

Wildfire of soybeans, a disease of leaves said to be caused by the bacterium *Phytoplasma tabaci*, was found to be rather widely distributed in Louisiana. It was not considered to be responsible for as much damage as the frog-eye leaf spot, but it is said to be potentially the most serious leaf disease of soybean. The causal organism is reported to be identical with the one that causes wildfire in tobacco, and is considered to be more virulent on tobacco than on soybean. The symptoms of the disease are similar to halo blight of beans.

**THREE UNDESCRIBED DISEASES.** A leafspot disease of cowpea, caused by a species of *Helminthosporium*, was found to be widespread on one large truck farm at LaPlace. The leaves were heavily spotted, and damage was apparent. The spots are characteristically zonate (see photograph) with a raised dark reddish center. Often these spots fall out and produce a condition known as "shot-hole." The Blackeye variety seemed to be more tolerant to the disease than other





Diseases new, or reported for the first time in Louisiana.

Upper left, Pepper blight, *Phytophthora capsica*.

Upper right, cotton leaf spot, *Ascochyta* sp.

Lower left, sorghum leaf spot, *Microdiplodia* sp.

Lower right, cowpea leaf spot, *Heliumthosporium* sp.

varieties tested, but is not considered to be resistant. The disease has also been found in South Carolina and North Carolina.

A wilt of *Crotalaria intermedia* was observed in a large Tung orchard near Covington. A fungus, as yet unidentified, was isolated from diseased plants and was found to be capable of reproducing the disease under controlled conditions in the greenhouse. Under greenhouse conditions, the wilt appeared to be sudden rather than the prolonged type which is preceded by a yellowing of leaves. Thus far both *C. intermedia* and *C. spectabilis* have been found to be susceptible to the wilt. Judging from field observations, the disease is capable of causing considerable damage, especially in the Florida Parishes where *Crotalaria* is grown as a cover crop in Tung orchards.

A number of recently imported African sorghums were grown in an experimental plot at the Experiment Station during 1944. Leaves on many of these plants were rather heavily spotted with an unfamiliar type of disease. A species of *Microdiplodia* was found to be constantly associated with the lesions (see photograph) and is probably responsible for them. Nothing is known about the possible importance of the disease.

## Sweet Potato Disease Investigations . . .

Theodore T. Ayers

These investigations which were started in 1939 are a part of a cooperative breeding project between the Division of Fruits and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, United States Department of Agriculture, and several southern agricultural experiment stations including the Louisiana Experiment Station.

The object of these investigations is the development of higher yielding and better quality varieties that are resistant to diseases, especially stem rot caused by *Fusarium* spp. and soil rot of which *Actinomyces ipomoea* Persons and Martin is the causal organism.

Standard varieties, introductions from foreign countries and other states, and selections from crosses made under the direction of Dr. J. C. Miller of the Horticultural Department of the Louisiana Agricultural Experiment Station are tested for disease resistance. Limited but severe tests are made during the fall and winter in the greenhouse while more extensive ones are conducted in the field during the summer to eliminate the susceptible sorts.

### Breeding for Soil Rot Resistance

The soil rot disease of sweet potato has been reported from practically every state where this crop is grown. It had never been con-



sidered a particularly serious disease before it was found in the chief producing area of Louisiana, St. Landry Parish. During several dry seasons the disease became so serious in that particular section that it threatened to wipe out the sweet potato industry. Therefore, it was necessary to find methods of control. One of the most promising methods is the breeding of resistant varieties. The use of such varieties has saved many other crops from becoming a total loss in certain areas and made possible a continuation of profitable production.

Since the sweet potato breeding program was started in 1939, several hundred sorts have been tested and some of them have proved to be resistant. In 1944, ninety-three sorts were tested in soil-rot infested soil and the roots of three of them were found to be free of lesions of soil rot when examined at digging time. The three selections are to be tested again in the field, and more extensively, in 1945 so that it can be determined definitely whether they are actually resistant or only escaped infection. Recent selections and sorts that have not been previously tested will be planted in the field to determine their resistance to soil rot.

### **Breeding for Stem Rot or Wilt Resistance**

Sweet potato stem rot (wilt) is widespread in its distribution and is one of the most serious of the field diseases of sweet potatoes. On many farms it has become so serious that planting this crop is no longer profitable, and it is increasing in its distribution in Louisiana. This disease is disseminated through planting stock and persists in the soil for many years after it once becomes established. Because of its threat to the sweet potato industry particular attention is being given to breeding stem-rot resistant varieties for table stock and for starch or feed purposes.

Hundreds of selections have been tested since the cooperative breeding program was started to determine their reaction to stem rot. Some of them are highly resistant and show considerable promise of being of commercial value. During last season (1944) ninety-five sorts were tested in the stem-rot infested field, thirteen of them showed no wilt symptoms during the summer or when examined at digging time. In addition, one hundred and one seedlings were tested in the greenhouse and eighty-three of them showed no symptoms of stem rot. These were obtained from crosses between stem rot-resistant parents. Although the probable commercial value of these is not determined yet, the results are of importance because they show the feasibility of breeding for resistance to stem rot.

One seedling, L 4-5, which was found to be highly resistant in previous tests was unaffected by the disease in this year's test. This

seedling is valuable not only because of its resistance to stem rot, but also because it is among the highest in starch content and is one of the highest yielders to be tested in this cooperative program. Furthermore, it is particularly interesting since it is probably the first sweet potato variety of economic importance to originate in the United States from true seed—that is seed obtained from flowers of the sweet potato. It is also being used as a parent in making further crosses, because of its resistance to stem rot, and its high yield and starch content.

### Black Rot Investigations

Black rot which is caused by *Endoconidiophora fimbriata* is widespread in its distribution and causes considerable loss in the field as well as in the storage house. It can be controlled if precautions are taken to use planting stock from disease-free sources, to treat the “seed” roots before bedding with such fungicides as bichloride of mercury, borax, or certain proprietary compounds according to directions and recommendations, to observe sanitary precautions in the field and storage, and to use vine cuttings rather than plants pulled directly from beds. This disease may increase rapidly where the sweet potato weevil is present since this insect has been demonstrated experimentally to be able to disseminate black rot.

Tests are being made to determine the relative resistance or susceptibility to black rot of available varieties, selections, and sorts, but no resistant ones have been found so far. During the past year, the roots of eighty-six sorts were inoculated artificially to determine their reaction to the disease. Examination about a month later showed that all of them were infected, but ten of them were slightly less susceptible than the others, but none of them was entirely resistant. Further tests are to be made with other sorts and introductions from foreign countries for resistant types that can be used as parents in the breeding program.

About six bushels of sweet potatoes infected with black rot were dehydrated with artificial heat at a plant operated by the Agricultural Engineering Department of the Louisiana Agricultural Experiment Station under the direction of Mr. Leland E. Morgan. This dehydrated material was used in several types of tests to determine whether the organism causing the black rot disease could survive the dehydration process. So far, the results of these tests as well as of those conducted last year with material from a commercial dehydration plant showed that the black rot organism is not living after the roots have been dehydrated at high temperatures in fast, artificial driers. On the other hand, it has been demonstrated definitely that the black rot organism is still living after sweet potatoes have been dried at low temperature by exposing them to the sun. This method of sun drying is used to

some extent in preparing sweet potatoes for stock feed. Therefore, it will be necessary to determine whether the black rot organism can survive passage through the digestive systems of farm animals that are ordinarily fed this product. If this were possible there would be danger of spreading black rot by the application of infested manure to non-infested fields. Nevertheless, there have been reports from different sources that the black rot fungus survives passage through animals and that the use of manure as fertilizer from these animals is a source of infestation of this organism.

In the case of the casual organism of stem rot, however, it was demonstrated experimentally in 1944 that it survived passage through the digestive system of a hog. Inoculations and isolations showed that when infected vines were fed to a hog, the causal organism could be recovered from the feces of the animal. Infected vines that were dried in the sun were mixed with bran and fed to the hog used in this test because he refused to eat either living vines that were infected with stem rot or dried infected vines alone. On the other hand, he ate readily healthy ones and even cultures of the fungus grown on an oat-wheat medium. The hog, as far as could be seen, suffered no ill effects from eating dried vines that were infected with stem rot or artificial cultures of the causal organism.

## Financial Statement — Agricultural Research Funds

JULY 1, 1943 to JULY 1, 1944

### FEDERAL RESEARCH FUNDS

	Hatch	Adams	Purnell	Bankhead-Jones
Appropriations	\$15,000.00	\$15,000.00	\$60,000.00	\$56,502.80
<i>EXPENDITURES — FEDERAL FUNDS</i>				
Salaries and wages	\$12,821.83	\$13,173.61	\$50,604.67	\$43,614.38
Supplies and expense	1,380.87	1,074.68	6,298.21	5,648.44
Travel	699.59	307.69	2,377.80	2,546.30
Capital Outlay	97.71	444.02	719.32	4,693.68
Total	\$15,000.00	\$15,000.00	\$60,000.00	\$56,502.80

### EXPENDITURES — STATE FUNDS

	Bankhead-Jones Offset	State Non-Offset	Other* State Funds	Research Fellowships
Salaries	\$38,915.18	\$50,532.81	\$ 46,859.27	\$10,694.36
Wages	12,040.10	3,038.23	30,321.36	2,879.15
Supplies and expense	10,567.33	19,501.16	38,355.56	8,376.89
Travel	3,038.93	2,454.48	7,522.55	1,688.05
Capital Outlay	1,125.53	6,822.28	25,106.68	946.39
Total	\$65,687.07	\$82,348.96	\$148,165.42	\$24,584.84

\*Includes appropriations for sub-stations and special Legislative appropriations.















# *Research in Agriculture*

LOUISIANA

ANNUAL REPORT  
1944 - 1945

W. G. TAGGART, DIRECTOR  
EXPERIMENT STATIONS





# *Research in Agriculture*

1944-1945



## ANNUAL REPORT



AGRICULTURAL EXPERIMENT STATION  
LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE  
BATON ROUGE, LOUISIANA

W. G. TAGGART, *Director*



Compiled by I. L. Forbes from Reports of Heads of  
Departments and Project Leaders

Year Ended June 30, 1945

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# *Letter of Transmittal*

Baton Rouge, Louisiana

May 25, 1946

GOVERNOR JAMES HOUSTON DAVIS

BATON ROUGE, LOUISIANA

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1945, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states.

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C., and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. TAGGART, *Director*  
Louisiana Agricultural Experiment Station



# *Agricultural Chemistry and Biochemistry*

*Nutrition Research Division*

※ ※ ※

## **Ascorbic Acid Value of Tomatoes Canned by Five Home Processing Methods**

A previous study indicated large variations in the individual ascorbic acid values of tomatoes which had been canned in homes by various processing methods and in different types of containers. Since only slight differences were found in the average ascorbic acid values for these methods of processing, this project was planned to determine whether tomatoes canned in one type of container under controlled conditions would show significant differences because of processing methods.

Two varieties of tomatoes, Marglobe and Dixie Gulf State Cross, were canned in scalded number 2 tin cans. After scalding, peeling, and coring, each tomato was cut into five vertical sections and these distributed to each of the containers for the five methods of processing. The following methods were used: A. The cold fruit was packed into the cans, then heated to 180°F. by surrounding the cans with boiling water. After sealing, the filled cans were processed for four minutes under 10 pounds pressure. B. Tomatoes were packed, heated in the cans, and sealed as in A, but processed in a boiling water bath for 35 minutes. C. Sufficient tomatoes to fill at least two number 2 cans were heated to the boiling point in an aluminum sauce pan, poured into the cans, sealed immediately, and processed for four minutes under 10 pounds pressure. D. Tomatoes were heated, packed, and sealed as in C, but processed 10 minutes in a boiling water bath. E. Sufficient tomatoes to fill at least two number 2 cans were boiled in an open aluminum sauce pan for 20 minutes, poured into the cans, and sealed.

All cans after sealing and processing were cooled immediately in running tap water. Eighteen cans were packed by each method. During the one week required for initial ascorbic acid determinations all cans were stored at refrigeration temperature.

At the conclusion of this period the remainder were stored at room temperature and analyzed six months later. The storage period was from June to December.

On the basis of moist weight, average ascorbic acid values for methods of canning other than open kettle were approximately equal; whereas in the case of the latter, a slightly higher average value was found. It

was obvious, however, when the results were calculated on the basis of dry weight, that this slightly higher value was due to a concentration of nutrients of the tomato rather than higher retention, for ascorbic acid values on a dry weight basis were lower in the case of the open kettle processed fruit. Average values for the freshly canned and the stored fruit processed by the different methods are shown in Table 1.

TABLE I. AVERAGE ASCORBIC ACID VALUES OF NINE CANS OF TOMATOES BEFORE AND AFTER SIX MONTHS STORAGE

Method of Processing	Milligrams Ascorbic Acid per 100 grams Moist Basis	
	June	December
A	16.6	14.4
B	17.2	14.6
C	17.0	14.8
D	16.6	14.6
E	18.3	16.0

None of the canned fruit showed evidence of spoilage. The flavor and appearance of the open kettle processed fruits was inferior to that processed by the other four methods, and cold packing resulted in larger head space than hot packing.—*Martha E. Hollinger and Leona Johns.*

## Varietal Differences in the Ascorbic Acid Value of Strawberries

Standard and seedling varieties of strawberries produced by the Horticulture Department of this station were analyzed for ascorbic acid three times each season during 1942, 1943, and 1944. Samples were obtained early in the production period, again when the plants were producing heavily, and near the close of the season when yields became smaller. During the 1942 and 1943 seasons, ascorbic acid values were highest in most cases early and late in the season. In 1944, however, the highest values were obtained at the mid-season sampling. Although ascorbic acid values for each variety varied considerably, those varieties having the highest values remained consistently in the higher ranks while those having lowest values remained consistently in lower ranks. The Fairmore variety had, in most instances, the highest ascorbic acid value of all varieties tested. The average results of all determinations made on the Fairmore variety was 77 milligrams ascorbic acid per 100 grams. A cross between two Blakemore-Klondike seedlings designated as 117-1 gave average results only slightly lower than Fairmore. The Klondike and Klonmore varieties ranked rather consistently low while the Konvoy variety was more variable. Average results of all determinations on these varieties were as follows: Konvoy, 62; Klondike, 58 milligrams per 100 grams.



A single sampling in 1945 included a number of seedlings which resulted from crossing the Fairmore with other varieties. Some of these showed values approximating those of the Fairmore while others ranked low.—*Martha E. Hollinger.*

## **Carotene and Ascorbic Acid Content of Sweet Potatoes**

This study, one of the Southern Cooperative Group Projects, has as its objective the determination of the effects of environment, curing, and storage on the carotene and ascorbic acid content of nine varieties of sweet potatoes. The sweet potatoes were produced through the co-operation of the Horticulture Department.

During a period of one week of curing and three weeks storing after harvest only slight changes were noted in the ascorbic acid and carotene content of the nine varieties of sweet potatoes. Further storage for another month indicated a rather definite trend toward lower values for both of these vitamins for all varieties.

Varietal differences in carotene content were definitely shown, values varying from 58.6 milligrams of carotene per 100 grams dry weight for L64 to 9.3 milligrams per 100 grams dry weight for B2934. There were only slight varietal differences in the ascorbic acid content.

—*E. A. Fieger, Harvye Lewis, Martha E. Hollinger,  
Leona Johns, and Janis Gibbens.*

## **Vitamin A Content of Milk and Butter**

In September, 1945, two years of analyses for vitamin A and carotene of dairy and creamery milk and creamery butter had been completed. The results obtained during the second year of the experiment confirmed those obtained during the first year with one exception (see Annual Report for 1943-1944). Because of better distribution of rainfall during the summer of 1945 resulting in better pastures and grazing, the vitamin content of dairy products was considerably higher for that period when compared with that of the previous year. Average values for vitamin A for the two-year period were: 1970 International Units per quart for herd milk, 1620 International Units per quart for creamery milk, and 14,500 International Units per pound of creamery butter.

—*E. A. Fieger and Harvye Lewis.*

## **Enriched Rice**

On December 4, 1945, the patent office granted to Louisiana State University patent number 2,390,210 on the process for fortifying of rice with vitamins, which process was developed in this laboratory. Subsequently the University Board of Supervisors adopted a resolution making available this process free of royalty or fee to the rice industry.

—*E. A. Fieger and Virginia R. Williams.*

## Further Studies on Growth Stimulants for the Microbiological Biotin Assay

The microbiological determination of biotin using *L. arabinosus* has been found stimulated by small amounts of rice oil in a manner similar to that reported by this laboratory for the biotin assay employing *L. casei*.

To determine whether the lipoid microbiological growth stimulants found in rice polish could be utilized as biotin by chicks, four diets were compared in a four weeks growth study with day-old White Leghorn chicks, using: (1) basal diet plus synthetic biotin, (2) basal diet plus natural biotin from rice polish, quantities of the latter calculated from microbiological assay of defatted (stimulants-free) rice polish, (3) basal diet plus natural biotin from rice polish, quantities of the latter calculated from microbiological assay of whole (stimulants present) rice polish, and (4) basal diet devoid of biotin.

After four weeks on the above diets administered ad libitum, chicks were examined for symptoms of biotin deficiency with the following findings: (1) diet 1, 7% deficient; (2) diet 2, 0% deficient; (3) diet 3, 83% deficient; (4) diet 4, 75% deficient. Under the conditions of the experiment, percentages for diets 1 and 2 were regarded as essentially the same; likewise, for diets 3 and 4.

It was then concluded that biotin calculations made from assay values of whole rice polish were invalid as regards biotin utilization by chicks, and therefore, that the lipoid materials responsible for the erroneously high assay values so obtained could not be used by the chicks as biotin.—*Virginia R. Williams and E. A. Fieger.*

## Human Nutrition Studies in Progress

One objective of this Department since its formation has been to include in its nutrition work investigations applying directly to human nutrition. This phase of the work has been greatly augmented through the grant of financial assistance generously supplied by the General Education Board. The following projects have been supported by funds from this grant.

### Study of Nutritional Status of Pregnant Women

A study is being made of the nutritive value of the diets consumed by pregnant women. The ascorbic acid content of the blood plasma will be correlated with ascorbic acid intake, and excretion of riboflavin, thiamine, and  $F_2$  (N methyl nicotinamide) will be correlated with dietary intake of the B vitamins.

These investigations are conducted in cooperation with and supported in part by the Louisiana Department of Public Health, Miss Margaret C. Moore, Nutritionist. Determinations of excretion of the B factors were made under the direction of Dr. Grace Goldsmith of the Tulane University School of Medicine.

As a supplement to this study and in conjunction with the Nutrition Education Research program of the Department of Home Economics, determinations of the ascorbic acid content of the blood plasma of approximately 100 high school girls are in progress.

—*Martha E. Hollinger, Maud Purdy, and Janis Gibbens.*

### **Utilization of Ascorbic Acid of Leafy Vegetables by Humans**

A continuation of the project undertaken in the spring of 1945, this project is designed to ascertain the utilization by human subjects of ascorbic acid from leafy vegetables in comparison with crystalline ascorbic acid. Results will be reported when data on sufficient subjects have been obtained to justify interpretation.—*Martha E. Hollinger.*

### **Exerimental Lathyrism**

Rations containing a high percentage of Singletary peas (*Lathyrus pusillus*) produce a characteristic paralysis (lathyrism) in young rats. This syndrome is caused by some extractable substance present in the pea since pea meals extracted with either water or alcohol are incapable of producing the condition. Brewer's yeast and casein do not have any protective action against lathyrism. Alpha-tocopherol in relatively large doses does have definite prophylactic value. This is not improved by the addition of inositol to the tocopherol supplement. Animals in the early stages recover promptly when placed on a good diet. Recovery is rare once the late stages of the paralysis have developed.—*Jordan G. Lee.*

### **The Detoxication of Tung Meal**

This project has been continued along lines indicated in the Annual Report for 1943-1944. It has been found that the toxicity of commercial expeller meals decreases markedly, but not completely, on common storage. This is not the case with the solvent extracted meal. The meals can be completely detoxified by a combination of heat treatment and alcohol extraction. Both treatments are necessary. As the toxic factor soluble in alcohol is also soluble in certain other solvents, these presumably could be substituted for the alcohol.

The protein of the detoxified meals is of little biological value as a supplement to cereal proteins.—*Jordan G. Lee.*

### **The Toxic Principles of the Tung Nut**

The tung nut toxic factor which is soluble in ethanol is also extracted to a less extent by acetone, acetic acid, benzene, carbon tetrachloride, chloroform, ether, ethyl acetate, and trichlorethylene. It is not extracted in detectable quantities by dioxan, nitromethane, or Skellysolve B. This factor is heat stable under conditions unfavorable to oxidation but is

easily destroyed in the presence of ferric ion and by saponification with alcoholic potassium hydroxide. By centrifuging, the alcohol extract may be broken into three parts. The fraction with the greatest specific gravity is non-toxic.

The above studies on toxicity have been supported by the grant of funds from the General Education Board.

—James A. Watson and Jordan G. Lee.

## *Division of Food Preservation*

### **Strawberry Studies**

The literature on the freezing of fruits contains conflicting reports concerning the concentration of sugar and sugar syrups which should be added to fruits to give the most desirable product. Recommendations for sugar syrup solutions vary between 35 and 70 per cent in sugar concentration; for sugar, from one pound of sugar to three pounds of fruit to one pound of sugar to six pounds of fruit.

The effects of syrup concentration, ratio of sugar to berries, preparation of berries, and conditions of freezing upon the chemical, physical, and organoleptic properties of strawberry packs were studied. Strawberries of the Klondike variety were prepared and frozen in the spring of 1944 and were examined during the summer and fall of 1945 after approximately 18 months storage at 0° F. All samples were packed in cellophane bags in end-opening cartons with overwrap.

Sliced berries packed with either dry sugar or sugar syrup gave a more desirable product than whole berries. The sugar penetrated more readily into the former resulting in a better preservation of the flavor and a uniform flavor in berries and juice. For whole berries packed with dry sugar a ratio of one pound of sugar to four pounds of berries gave the superior product and resulted in a better interchange between the sugar and the juice of the strawberries, than those in which less sugar was used. Samples packed without sugar were of very poor flavor and of exceedingly sour and slightly salty taste. No marked differences in physical or chemical properties were noted when freezing in still air was compared with freezing on plate freezers. Under the conditions of this experiment, however, the rate of freezing by the two methods was not greatly different. In a comparison of the samples which were frozen immediately and those frozen after one hour's delay, the former samples had greater concentration of sugar in the berries than the latter samples, contrary to expectation. This difference, however, arises from the fact that in the latter method more juice accumulates in the lower part of the package and results in less contact of sugar with berries. Delay in freezing under these conditions, therefore, is not recommended.



The average freezing point of the juice after thawing from samples containing 16.6 per cent dry sugar was 22.96° F. (—5.02° C.) for strawberries frozen whole, and 25.23° F. (—3.76° C.) for the sliced berries. For syrup packs containing the same per cent sugar the value for whole berries was 19.60° F. (—6.89° C.) and for sliced berries 24.93° F. (—3.99° C.). The freezing point of the drip from berries frozen without added sugar or syrup was 29.46° F. (—1.41° C.).

—*E. A. Fieger, C. W. DuBois, and S. Kalogereas.*

## Shrimp Studies

Shrimp is an important food because of the high nutritive value and pleasing flavor. As an article of commerce of the state of Louisiana and a source of income, the industry bulks large, the catch for 1944 being 105,000,000 pounds valued in excess of \$9,000,000.

Since little scientific information is at present available to the shrimp industry, the Division of Food Preservation began in the fall of 1944 a series of chemical and bacteriological investigations of the problems involved in the handling, processing, storing, packaging, and freezing of shrimp. Expansion of these studies has been aided by a grant from the Refrigeration Research Foundation.

### Frozen Shrimp

Many factors may affect the quality of frozen shrimp. In this investigation a study was made of the effect upon quality of (1) various handling methods and conditions and (2) holding fresh caught shrimp before freezing. A field laboratory was set up aboard the shrimp vessel "Betty Jean" owned by Mr. G. C. Lewis. Shrimp samples for this study were taken immediately after the nets were hoisted onto the deck, the shrimp being either headed or left as whole shrimp, and frozen immediately or packed in ice for varying periods of time. At the time of freezing all samples were packed in one-piece telescope boxes with outside overwrap of glassine and were frozen in a plate freezer aboard the boat. The samples were stored for six and nine months at 0° F. before organoleptically tested. For these tests, the samples without previous thawing were cooked in boiling water for 15 minutes, a one-pound box of shrimp being added to one quart of water.

The organoleptic tests showed, for quick freeze preservation and storage, that shrimp should be headed and frozen as soon as possible after catching. Shrimp packed in ice for longer than four days as headed shrimp or longer than three days as whole shrimp before freezing resulted in a definitely inferior product after six months frozen storage. After nine months frozen storage only those shrimp which had been headed and frozen immediately after catching were satisfactory. Greater difficulty, because of adherence of the shell to the meat, was encountered in peeling those samples which had been in frozen storage

for nine months. It was also noted that the shell tended to split into layers and in many cases thin layers of shell remained adhering to the meat. The uncooked shrimp had normal appearance except for dark areas at the shell joints; after cooking, peeled shrimp were normal in appearance.—*E. A. Fieger and C. W. DuBois.*

### **Packaging of Shrimp**

It is well recognized that proper packaging with moisture-vapor-proof material is necessary to prevent drying of the product since the drying of the product during storage causes marked changes in flavor and general quality. In this study fresh caught headed shrimp were packaged and frozen in various type containers now being manufactured and used by industry. Moisture losses were determined by weighing at regular intervals. For the various packaging materials, moisture losses after 12 months storage were as follows: one-piece telescope carton, 1.6 per cent; two-piece telescope carton with overwrap, 2.34 per cent; moisture proof bag in carton, 2.34 per cent; two-piece telescope carton, 5.23 per cent; and container now generally used, 6.55 per cent. Examination of the shrimp after 12 months storage showed a definite correlation between moisture loss and appearance.—*E. A. Fieger and C. W. DuBois.*

### **Loss of Added Vitamin C in the Storage of Frozen Peaches**

In the frozen food industry the use of ascorbic acid (vitamin C) to inhibit browning of peaches and apricots is rapidly gaining favor, especially for fruits in consumer packages, because it is effective without altering the flavor or color and it enhances the food value of the fruit.

Various preparation procedures and types of sugars were studied in relation to their effect upon the retention of vitamin C during subsequent frozen storage of peaches. Elberta variety peaches of uniform ripeness, obtained from the North Louisiana Agricultural Experiment Station, were used in this study. Preparation procedures included steam peeling and lye peeling. In steam peeling, the peaches were exposed to live steam for 45 seconds, then cooled. The peel was then removed by hand, quickly and easily. In the case of lye peeling, the peaches were immersed in a hot lye solution until the skins were loosened. The lye and the peel were removed from the fruit by washing in a stream of cold water. In one set of samples the lye remaining on the fruit after peeling was neutralized by immersion of the fruit in a 2 per cent citric acid solution. The sugars used included cane sugar syrup, and third-run cane sugar syrup. The peaches were packed in cellophane-bag-lined end-opening cartons with overwrap. Each package contained 300 grams of peaches, 100 grams of 50 per cent syrup and 0.25 grams of added vitamin C. All samples were stored at a uniform temperature of  $0^{\circ}\text{F.} \pm 2^{\circ}$

F., except one series packed in cane sugar syrup, which was held in a fluctuating temperature of  $+5^{\circ}$  F. to  $-5^{\circ}$  F.

The greatest loss of vitamin C occurred during frozen storage as a result of fluctuating temperature. Of the added ascorbic acid, 50 per cent was lost during the storage period of one year, while like packs stored at a relatively constant temperature lost but 32 per cent of the vitamin C during the same period. Steam peeling resulted in a slightly higher ascorbic acid retention than lye peeling. The effect of lye peeling on ascorbic acid retention, however, was less striking than that of fluctuating temperature. The use of 2 per cent citric acid dip to neutralize the lye residue after scalding in hot lye showed a slight advantage over removing lye by a water rinse. The type of sugar used had no effect upon ascorbic acid retention.—*C. W. DuBois and Dorothy Colvin.*

## Potato Studies

This work is a continuation of the project undertaken several years ago to develop methods of preparing, freezing, and storing Irish potatoes. Seventeen varieties of Irish potatoes were cut French fry style, Julienne strips, steam blanched and frozen. Storage for a period as short as one month resulted in an unsatisfactory product when cooked in deep fat. The potatoes had a "warmed over" taste, and were greasy throughout. Upon cooling to room temperature they rapidly lost their crispness.

Partial cooking of the potato strips in deep fat at  $180^{\circ}$  C. ( $356^{\circ}$  F.) for two and one-half or for five minutes, instead of steam blanching, to inactivate enzymes resulted in a much superior product. After four months storage at  $0^{\circ}$  F., cooking in deep fat for five minutes resulted in a golden brown product which was firm, crisp, and of good flavor. Although the interior was white and flaky there was evidence of slight greasiness.

This work is being conducted in cooperation with the Division of Fruit and Vegetable Crops and Diseases of the United States Department of Agriculture.—*E. A. Fieger and L. E. LeClerg.*

## Variety Studies

### Strawberries

For the past three years recognized varieties as well as seedlings developed by the Horticulture Department have been organoleptically tested for adaptability to freezing preservation. Of the varieties used most commonly in the state, Konvoy rated best each year, Klondike second best, and Klonmore third.

## Peaches

Eight varieties of peaches obtained from the North Louisiana Experiment Station were tested this past season for adaptability to freezing preservation. The peaches were steamed, peeled, pitted, sliced, and packed with and without added ascorbic acid, in cellophane bags in end-opening cartons with overwrap. Each package contained 300 grams peaches and 100 grams 60 per cent cane sugar syrup.

The addition of 270 milligrams of ascorbic acid (vitamin C) per package resulted in a product which had a much superior appearance and a better flavor.

The varieties were rated by six judges for the two methods of preparation as follows:

<i>Rating</i>	<i>Without Ascorbic Acid</i>	<i>With Ascorbic Acid</i>
1 .....	Elberta	Hale
2 .....	Early Elberta	Elberta
3 .....	Hiley	Hiley
4 .....	Hale	Early Elberta
5 .....	Belle of Georgia	Belle of Georgia
6 .....	Vidette	Vidette
7 .....	Hale Haven	Hale Haven
8 .....	Golden Jubilee	Golden Jubilee

—*E. A. Fieger and Martha E. Hollinger.*



# *Agricultural Economics*

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## **Economic Aspects of Peach Production in Louisiana**

The production of peaches is concentrated in the northern, hilly section of Louisiana, where they have been grown for many years. The declining importance of cotton as a cash crop has stimulated commercial development significantly. The need for developing new enterprises is primarily responsible for the keen interest in peach production possibilities of the area.

### **The Cost of Establishing Orchards**

The production of peaches requires high capital investment per acre in comparison with most other farm crops. Peach trees do not normally bear the first crop until the fourth year. The cost of establishing an acre of peaches on mechanized and non-mechanized farms under two different price levels, 1944 and 1935-39, is shown in Table 1. The establishment costs were slightly higher on mechanized farms than on non-mechanized farms. As a rule orchards on mechanized farms were handled more carefully and better practices were carried out in regard to cultivation, fertilization, cover crops, and other orchard practices.

TABLE 1. COST OF ESTABLISHING AN ACRE OF PEACHES IN THE  
NORTH LOUISIANA UPLAND COTTON AREA

<i>Period</i>	<i>Mechanized Farms</i>		<i>Non-Mechanized Farms</i>	
	<i>1944 Prices</i>	<i>1935-39 Prices</i>	<i>1944 Prices</i>	<i>1935-39 Prices</i>
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
First year .....	38.53	29.92	38.22	27.59
Second year .....	31.29	22.27	22.92	15.09
Third year .....	32.57	23.49	26.79	17.51
Total for 3 years .....	102.39	75.68	87.93	60.19

### **Costs and Returns from Orchards in Production**

The data on cost and returns shown in Table 2 are based on methods of orchard management as practiced by commercial producers and do not in all cases represent desirable or recommended practices. Produc-

tion costs per acre were higher on mechanized farms than on non-mechanized farms, but costs per bushel were lower because of higher yields. Returns from the enterprise were larger on the mechanized farms, where better orchard practices were generally followed.

TABLE 2. COSTS AND RETURNS OF THE PEACH ENTERPRISE IN THE NORTH LOUISIANA UPLAND COTTON AREA

Item	Mechanized Farms		Non-Mechanized Farms	
	1944 Prices	1935-39 Prices	1944 Prices	1935-39 Prices
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Production costs per acre.....	80.96	52.48	69.55	43.12
Average cost per bushel.....	0.76	0.51	0.83	0.54
Average price per bushel.....	2.62	1.09	2.62	1.09
Net returns per bushel.....	1.86	0.58	1.79	0.55
Net returns per acre.....	196.76	58.70	150.53	44.08
Average returns per hour of labor.....	1.96	0.63	1.66	0.52
Average yield per acre in bushels.....	106	102	84	80

### Observations and Recommendations

From the standpoint of resources, peaches can be produced commercially in the northern part of Louisiana. State average yields are below national average yields, .75 bushel per tree as compared with 1.25 bushels per tree in the period 1940-44. The relatively low state average occurs because 55 per cent of the peaches produced in Louisiana are for home consumption and are produced in home orchards under poor management practices. The average yield per tree in commercial orchards was slightly over 1 bushel, and yields can be further increased by following

desirable orchard practices. The farm price of Louisiana peaches has been less than \$1.00 a bushel only one year since 1916 and has generally been higher than the United States farm price.

The development of the enterprise affords many farmers an opportunity for achieving better utilization of the farm resources. Land and equipment that are not fully utilized may be put to productive uses. Peaches are an intensive labor crop, and farm labor is provided with employment when other farm work is not pressing. Managerial requirements are exacting, but there appears to be ample managerial capacity for further development of the enterprise commercially. Since peach production is expanding commercially, it is essential that effective methods of grading, packaging and selling be developed. Emphasis on marketing phases is as important as production in the development of the enterprise in Louisiana.—*Frank D. Barlow, Jr.*

# The Mechanization of Cotton Production in Upland Areas

There has been a tendency to underrate the possibilities afforded by mechanization in the upland sections as compared with delta areas and other areas with relatively smooth topography. The data on requirements, income, costs and returns, for different power systems indicate that considerable economies are possible in cotton production in upland areas.

## REQUIREMENTS, INCOME, COSTS AND RETURNS PER ACRE OF COTTON UNDER DIFFERENT POWER SYSTEMS, NORTH LOUISIANA UPLAND COTTON AREA, 1944

Item	Mule Power	Tractor Power	
	One-half row equipment	One-row equipment	Two-row equipment
Total pre-harvest man labor (hours) . . . . .	45.5	24.3	20.5
Total man labor (hours) . . . . .	82.3	60.4	56.6
Total mule work (hours) . . . . .	38.9	....	....
Total tractor work (hours) . . . . .	....	9.8	6.0
Gross income per acre . . . . .	\$50.10	\$50.10	\$50.10
Total pre-harvest operating expense . . . . .	28.27	19.76	16.96
Total operating expense . . . . .	41.36	32.23	29.43
Net return per acre . . . . .	8.74	17.87	20.67
Return to labor per acre . . . . .	27.76	31.96	33.62
Return to labor per hour . . . . .	0.34	0.53	0.59
Reduction in operating expense by using tractor power . . . . .	....	9.13	11.93
Percent reduction in operating expense by using tractor power . . . . .	....	22.1	28.3

Man labor requirements prior to harvest are reduced 25.0 hours an acre when two-row tractors replace mule power and 21.2 hours when one-row tractors are used instead of mules. Sizable reductions in man labor requirements are obtainable even though tractors are used only for land preparation. The timeliness in performing operations with tractors results in additional advantages. Hand labor is still required for hoeing and picking, but experimental results with flame cultivators, mechanical choppers, and mechanical pickers indicate that further improvements may eliminate more hand work in cotton production.

Operating expenses were reduced from \$41.36 where mules were the source of power to \$32.23 with one-row tractors and \$29.43 with two-row tractors. The percentage reduction in operating expenses was 22.1 per cent where one-row tractors replaced mule power and 28.3 per cent where two-row tractors were used.

Returns to labor were higher with mechanical power. At 1944 price-cost relationships, cotton returned 34 cents an hour to man labor when mules were used, 53 cents when one-row tractors were used, and 59 cents when two-row tractors were used.

Farm mechanization affords many opportunities for improving the status of upland farmers, especially in regard to increasing production efficiency and lowering production costs. The labor and other resources, such as land for raising feed that is normally fed to workstock, which are released through mechanization may be utilized advantageously in expanding other productive farm enterprises. Expanded and diversified systems which obtain better distribution and fuller utilization of farm labor are encouraged by mechanization and should result in increasing net farm incomes on mechanized farms.

—*Frank D. Barlow, Jr., and Leo J. Fenske.*

## Tractors on Upland Farms in North Louisiana

The trend in recent years toward mechanization has been rapid in the hill sections of Louisiana. The number of tractors in the North Louisiana upland cotton area increased from 41 in 1925 to 104 in 1930, 288 in 1940, 474 in 1942, and 661 in 1944.

Results from research on farm mechanization in the upland area for 1944 show that machinery inventory values averaged \$2,365 per farm of 135.5 acres in cropland. Of the total machinery investment, 78 per cent was for tractors and tractor equipment and 22 per cent was for mule-drawn equipment. The annual cost of operating tractor equipment (exclusive of tractors, hay balers, combines, and peanut pickers) was \$160 per farm. The annual cost of operating mule-drawn equipment was \$128 per farm.

Tractor operating costs in 1944 averaged \$4.22 per 10-hour day of use for all tractors, consisting of \$2.98 for cash expenses and \$1.24 for overhead costs. One-row tractor costs averaged \$3.88 per 10-hour day; two-row tractors of less than 17 drawbar horsepower, \$4.05 per day; and two-row tractors of 17 horsepower and over, \$4.87 per day. Workstock costs averaged 22 cents an hour of use at 1944 prices.

This study revealed that on an average each tractor in operation displaced 3 mules. Farmers estimate that when tractors are fully utilized, one tractor accomplishes as much work as 4 to 8 mules or an average of 6. The number of mules has not been reduced to a minimum; hence, over-all power costs on many farms can be reduced still further.

The man labor requirements for crop production were substantially less where mules were replaced with mechanical power. Reductions in man labor requirements per acre through the use of tractors ranged from



25 to 60 per cent, depending upon the crop and the extent of mechanization. The most significant reductions occurred in pre-harvest operations, because harvesting operations for most crops have not yet become fully mechanized.

Production costs were reduced through the use of tractors, and the returns to labor for each selected crop were greatest when operations were highly mechanized as compared with mule production methods. In 1944 cotton returned 34 cents an hour to labor when mules were used for power and 59 cents an hour when two-row tractors replaced mules; corn returned 3 cents and 29 cents an hour, respectively; sweet potatoes 58 and 68 cents; and peanuts 44 and 73 cents. Other crops show similar relationships.—*Frank D. Barlow, Jr., and Leo J. Fenske.*

## Cost of Operating Tractors and Other Mechanical Equipment in Delta Areas of Louisiana

### Tractors and Tractor Equipment

The average cost of operating the 179 tractors was \$5.58 per 10-hour day in 1944. The number of 10-hour days of use per year for all tractors was 94.8. Tractors on rubber were used 103.6 days and those on steel were used 78.5 days per year.

The inventory values of tractor equipment excluding combines and hay balers averaged \$1,418 per farm, ranging from \$444 on farms with less than 50 acres in cropland to \$2,657 on farms of over 300 acres. The annual cost of repairs, depreciation, and interest for tractor equipment per farm was \$289, ranging from \$85 per farm with less than 50 acres to \$566 for farms with over 300 acres of cropland. The average cost of equipment per acre for all farms was \$1.28 and per hour of use, 18.5 cents.

### COST OF OPERATING TRACTORS IN THE MISSISSIPPI RIVER DELTA COTTON AREA, 1944

Size	Rubber Tires			Steel Rims		
	Tractor	Average drawbar horsepower	Cost per 10-hour day	Tractor	Average drawbar horsepower	Cost per 10-hour day
	Number	Number	Dollars	Number	Number	Dollars
Small.....	14	16.04	4.98	4	14.14	4.48
Medium.....	58	24.13	5.31	49	22.93	5.64
Large.....	42	31.65	5.85	12	29.85	6.88
All tractors.....	114	25.91	5.48	65	23.67	5.80

## Combines and Hay Balers

The annual cost of operating thirty-one 60-inch combines with the power take-off was \$171.45, of which \$49.83 was for repairs and upkeep, \$97.14 for depreciation, and \$24.48 for interest. In 1944, 99 acres were harvested per machine and the average annual cost of combines per acre was \$1.73. The cost of man labor and the tractor is not included. The cost of operating thirty 60-inch combines with auxiliary motors was \$232.49, of which \$43.39 was for repairs and upkeep, \$130.23 for depreciation, \$33.60 for interest, and \$25.27 for operating costs of the auxiliary motor. In 1944, 119 acres were harvested per machine and the average annual cost of combines per acre was \$1.95. The cost of man labor and the tractor is not included. The efficiency in harvesting gained by using combines with an auxiliary motor more than offsets the higher costs of operation.

The annual cost of operating hay balers in 1944 varied considerably with the type of baler. The annual cost of operating 5 stationary balers without an auxiliary motor averaged \$33.69 in 1944, of which \$8.00 was for repairs and upkeep, \$17.68 for depreciation, and \$8.01 for interest. An average of 97 acres was baled per machine and the per acre cost was 34 cents. The annual cost of operating 21 stationary balers with an auxiliary motor averaged \$54.32 in 1944, of which \$10.75 was for repairs and upkeep, \$29.44 was for depreciation and \$14.13 was for interest. An average of 102 acres was harvested per baler and the per acre cost was 53 cents. The annual cost of operating 12 pick-up balers (3 men) averaged \$164.32, of which \$28.08 was for repairs and upkeep, \$104.56 for depreciation, and \$31.68 for interest. An average of 164 acres was harvested per baler and the per acre cost was \$1.00. The higher cost of operating pick-up balers is offset by increased labor efficiency which results in lower harvesting costs per acre and per ton of hay.

—*Frank D. Barlow, Jr., and Leo J. Fenske.*

## Farm Management and Cost Studies

### Sugar Cane Mills

The costs of manufacturing 100 pounds of raw sugar varied from less than \$3.00 per hundredweight in the 1937-41 pre-war period to \$3.29 in 1942, \$3.45 in 1943, and \$3.81 in 1944. The net profit per hundred pounds varied from \$0.42 per hundredweight in 1941 to \$0.34 in 1942, \$0.28 in 1943, and a loss of \$0.08 in 1944. The relatively high costs and low returns in 1944 as compared with the three previous years were due to the fixed price of sugar and increasing costs for labor and materials and a relatively low yield of sugar per ton of cane as obtained in 1944.

The analysis of wage rates paid indicated that a 65 cent minimum wage under 1944 conditions will result in a further increase in costs of \$0.27 per hundredweight of raw sugar produced and that the elimination

of the overtime-pay exemption during the grinding season will increase costs an additional \$0.15 per hundred pounds of raw sugar.

### **Large Sugar Cane Farms**

Total costs of producing sugar cane on large farms varied from \$4.59 per ton in 1941 to \$5.93 per ton in 1944. Receipts increased from \$4.21 per ton to \$6.58 during the same period. Because of higher prices received for sugar cane, including government payments of various types, net incomes per farm and per ton of cane were higher during the war years of 1942-44 than in any of the five preceding pre-war years.

### **Small Family-type Sugar Cane Farms**

The costs for growing and harvesting a ton of sugar cane on family-type sugar cane farms in Louisiana varied from \$3.78 per ton in 1938 to \$4.69 in 1943 and \$6.14 in 1944. The rapid increase in costs from 1943 to 1944 was due to increased costs for input items, mostly hired labor and machinery, and to lower than average yields obtained in 1944. These farmers incurred a loss of about 8 cents per hour of man labor in 1938 and 1940, earned about 40 cents per hour in 1942 and 1943, and made about 10 cents per hour in 1944. In pre-war years, with relatively low labor costs, the small farms produced cane cheaper than the large farms. In 1944, with high labor costs and the difficulty of mechanizing on small farms, the large farms produced a ton of cane about \$0.20 per ton cheaper than the small farms.

### **Milk Production Costs**

The cost of producing milk in the Southeast Louisiana, or Florida Parishes, dairy area was about two and one-half times as great in early 1946 as in the pre-war year 1938. Total costs per hundredweight of milk produced averaged \$2.18 in 1938, increased to \$4.65 in 1944, and to \$5.41 in February, 1946.

The return per hour of labor on the dairy enterprise in the region is indicated to be about 20 cents for 1946, based on relative prices and costs in February, 1946. This means that the farmers in the area have the prospect of making a net return of 20 cents for each hour of labor in producing milk but are having to pay an average of 40 cents per hour for all labor hired. With this situation, a declining trend in the production of milk in the area is to be expected.

### **Sweet Potatoes in Northwest Louisiana**

The sweet potato enterprise in Northwest Louisiana was relatively profitable in 1943, returning 47 cents per hour of man labor and bringing higher returns over all expenses per acre and per hour of man labor than cotton, peanuts, or corn. Also, under long-time average conditions, sweet potatoes in this region are indicated to be in a strong competitive position when compared with cotton, peanuts, and corn.

—J. Norman Efferson.

## Wartime Production Capacity on Louisiana Farms

The wartime demands for food, oils and fiber were indicated by means of annual production goals, and production was implemented by educational programs, price floors, and subsidy payments. The first step in the goal-making process was an annual preview analysis of the production possibilities in each of the 48 states. In Louisiana this work was done by a committee composed of workers in the Experiment Station, the Agricultural Extension Division, and the United States Department of Agriculture. The first production capacity report was prepared in 1942 and the current one during the summer of 1945.

TABLE 1. 1946 CROP PRODUCTION GOALS WITH COMPARISONS, LOUISIANA\*

Crop	1944 reported	1945 reported	1946 goal†	% 1946 goal is of 1945
	1,000 acres			
Corn.....	1,319	1,187	1,200	101
Cotton.....	938	866	1,000	115
Sugar cane (sugar and seed).....	268	269	288	107
Rice.....	568	584	584	100
Sweet potatoes.....	109	124	109	88
Irish potatoes.....	68	46	52	113
Oats.....	210	225	275	122
All tame hay.....	295	290	500	172
Soybeans for beans.....	29	28	25	89
Peanuts for nuts.....	8	7	5	71
Sorghums, all except sirup.....	15	13	15	115

\*La. D. A. E. Mimeographed Circular No. 51, July 1945.

†Production and Marketing Administration.

The estimates of maximum production indicate that the acreages of cotton, oats, tame hay, Irish potatoes, and sugar cane could be increased in 1946 (Table 1). The suggested acreages for corn, rice, and truck crops are about the same as the 1945 acreages. The report stresses the need for a greater acreage of improved pastures and increased production of feed crops as a basis for the further expansion of livestock production.

Louisiana is a deficit state in the production of all classes of livestock, and it is recommended that livestock numbers should expand as feed production increases. This is a long-range program; hence dairy cattle, beef cattle and sheep numbers in 1946 should remain at about 1945 levels (Table 2). A small increase in sows to farrow in 1946 should take place because heavy marketing of all classes of hogs in late 1944 and 1945 greatly reduced the numbers of brood sows. A decrease in poultry was suggested for 1946.—*Leo J. Fenske and B. M. Gile.*



TABLE 2. 1946 LIVESTOCK PRODUCTION GOALS WITH COMPARISONS,  
LOUISIANA\*

<i>Livestock and livestock products</i>	<i>Unit</i>	<i>1944 reported</i>	<i>1945 reported</i>	<i>1946 goal†</i>	<i>% 1946 goal is of 1945</i>
<i>1,000 units</i>					
Milk cows‡	Number	296	299	296	99
Milk production	Pounds	696,000	709,000	710,000	100
Hens and pullets	Number	5,746	4,926	4,286	87
Chickens raised	Number	8,593	9,452	8,215	87
Eggs produced	Dozen	34,500	31,917	27,235	85
Turkeys	Number	69	69	69	100
Cattle and calves	Number	1,418	1,461	1,461	100
Sheep and lambs	Number	258	253	240	95
Sows to farrow (spring)	Number	143	119	125	105
Bees (colonies)	Number	68	75	79	105

\*La. D. A. E. Mimeographed Circular No. 51, July 1945.

†Production and Marketing Administration.

‡Average number on farms during year.

## Cottonseed Marketing

A study of the marketing of cottonseed in Louisiana during the 1943-44 season shows that local ginnerers purchased 87.1 per cent of all cottonseed. Farmers retained 7.2 per cent as planting seed, 2.4 per cent as feed for livestock and fertilizer and 3.3 per cent for sale as planting seed. The value of cottonseed was over 15 million dollars. Cottonseed alone ranked sixth in value among the major field crops grown in Louisiana and its value is about 18 per cent of the total income from the cotton crop. Many farmers use some seasonal credit in production, and the first bales of lint cotton sold are obligated in payment of these debts. For these farmers, the income from cottonseed provides the cash needed to pay the cash costs connected with the cotton harvest.

Oil mills paid a minimum price of \$56 a ton for cottonseed with a base grade equal to 100, with premiums and discounts for seed of other grades. Ginnerers determined the price to be paid to growers by deducting a handling margin from the price received from oil mills. Average margins taken by ginnerers varied from —\$0.69 to \$8.40 a ton. The main causes of the wide variations in margins were associated with: (1) the use of different methods in calculating weights of cottonseed; (2) variation in prices for cotton lint and absorbing losses from cottonseed; (3) methods used in making seed settlements with growers; (4) charging a low price for ginning services and taking above average margins on cottonseed; and (5) the degree of competition among gins. The adoption of more uniform trade practices would tend to reduce the present wide variations in margins taken by ginnerers.

—James F. Hudson and B. M. Gile.

## Cotton Marketing

The Louisiana Agricultural Experiment Station cooperates with the Production and Marketing Administration in providing a free cotton classing and market news service for eligible producers in Louisiana. This service is provided for by a federal law, commonly known as the Smith-Doxey Act. The free cotton classing service has increased the effectiveness of farmers in bargaining for the sale of their cotton. The growing of better grade and staple cotton is encouraged when farmers are able to sell such cotton for the higher price which it commands.

Twelve new cotton improvement groups were formed in 1945. The number of parish wide groups increased from 11 during 1944 to 23 in 1945. The acreage of one-variety cotton increased from 277,567 in 1944 to 389,184 in 1945. By February 1, 1946, 60,289 bales of the 1945-46 crop had been classed for marketing purposes, or 15.3 per cent of the estimated total state production, as compared with 64,876 bales, or 10.9 per cent, during the 1944-45 season. The general participation of farmers in the program is increasing rapidly in Louisiana.

—*James F. Hudson and B. M. Gile.*

## Prices and Statistics<sup>1</sup>

The general level of prices received for agricultural products by Louisiana farmers increased steadily through 1945. The composite index of prices received by farmers rose from 133 in December, 1944, to 145 in December, 1946 (1925-29=100). Demand for agricultural products continued strong throughout the year. Volume of production of basic agricultural commodities was high for products other than cotton and cottonseed.

Prices paid by farmers continued to rise slowly during 1945. The ratio of prices received to prices paid changed very little during the year. Total cash receipts from farm marketings in Louisiana were approximately the same in 1945 as in 1944.—*J. P. Montgomery.*

<sup>1</sup> Basic data are obtained through a cooperative agreement between the Louisiana Office of the Division of Agricultural Statistics, Bureau of Agricultural Economics, U. S. D. A., and the Agricultural Experiment Station.

# *Agricultural Engineering*

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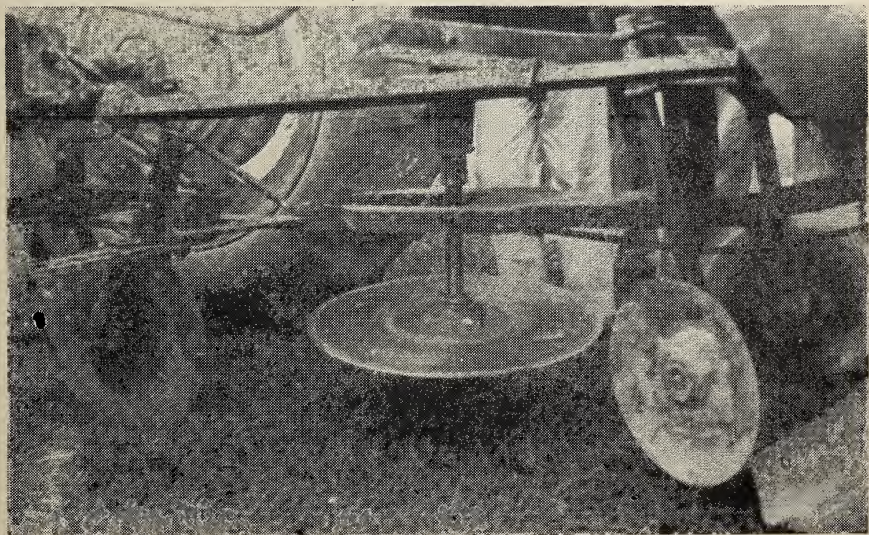
## **Sweet Potato Machinery and Equipment**

### **Hotbeds**

Experiments carried out on hotbeds using electric cables and lamps as a source of heat indicate that lamps are a more economical source of heat and will give just as early plants as cable-heated beds. Cloth covers also proved to be as satisfactory as glass sash. Even though cloth covers would have to be replaced every third season, the initial cost is very low as compared to glass sash, and cloth can be made to fit any size or shape bed. While manure-heated beds gave a larger total number of plants, the plants were produced in quantity later than with the electric cable or the electric lamp beds. Further study will be made on optimum placement and spacing of both cables and lamps for sweet potato hotbeds.

### **Harvesting**

A standard 26-inch potato digger has been modified to include a vine cutting attachment. This machine has been used successfully for the



Vine Cutting Attachment for Sweet Potato Digger



past two seasons to dig sweet potatoes in one operation. Harvesting studies during this period indicate that the mechanical digger can dig potatoes in about one-half the time required by the moldboard plow and increase the quantity of marketable potatoes harvested by 20 per cent, and also increase greatly the total (including culls, etc.) potatoes dug. These culls and unmarketable potatoes can be dehydrated for stock feed. It is estimated that a farmer owning his own tractor can pay for a mechanical digger from increase in harvested potatoes alone in the first 20 to 30 acres dug. The mechanical digger is desirable in the control of weevils as it exposes the entire potato plant, allowing the plant to decay. A smaller tractor-mounted mechanical digger is being designed and will be tried during the 1946 season. This type of digger is particularly desirable for the small farmer desiring a lower first-cost machine and also one that can be handled more easily in smaller fields.

### Dehydration

The artificial drying of unmarketable sweet potatoes for livestock feed has gained considerable prominence in the past few years. Approximately 10 small community dehydrators were installed during the 1945 season under the supervision of the Experiment Station.

Counter-flow drying with a direct-fired drier was tried this past year, and results indicate that while such a method may improve the quality of the product, it cuts down on the capacity of the drier. This arrangement also necessitates considerable change in the drum fins of the present driers, or the drums must be elevated to a suitable height to allow the product to feed by gravity against the air flow. A new method of feeding the raw material into the direct-fired, parallel-flow drier is contemplated for trials for the 1946 season. This is to prevent burning of the fine material as it is fed into the hot part of the drum next to the furnace.—*Leland E. Morgan and Wiley D. Poole.*

### Flame Cultivation

Butane and propane flame cultivators of one, two, three and four rows were worked with during the 1945 season. In both laboratory and field the propane machine gave a higher flame temperature, better flame pattern, and a more economical machine both in first cost and cost of operation. The burner is the most important part of the machine in order to get a proper flame.

After designing and testing 12 homemade and commercial burners a burner was designed that is very simple and gives the best weed kill of any burner tested, with an economy of fuel.



One-row propane machines can be operated without a special gasifier; but with more than two burners it is recommended that a special gasifier be used to maintain pressure at the burners, especially if butane or a mixture of butane and propane is used.—*Harold T. Barr.*

## The Effect of Organic Matter, Deep Plowing, and Vegetable Cover on the Runoff, Erosion, and Crop Yields of the Lower Mississippi Loessial Soils

This is a cooperative project between the Agricultural Engineering Department of Louisiana State University and the Division of Water Control and Drainage, Soil Conservation Service, U. S. Department of Agriculture.

In a rotation of cotton, cotton and corn the common practice is to reverse the rows, plowing about six inches deep. Half of this project was plowed twelve inches deep, thoroughly mixing the top soil with the six inches of subsoil directly under it. Bringing up this new soil reduced the cotton yields to a small degree. The cover crop and deep plowing increased crop yields and decreased soil loss as shown by the following table.

<i>Cotton Lbs./A</i>	<i>Soil loss Lbs./A.</i>	<i>% Organic Matter</i>	<i>Water Loss Inches/A.</i>	<i>Treatment</i>
707.85	2946.79	1.01	13.24	Deep plowed (12") 10/24/44—No winter cover crop.
843.70	5277.12	1.09	20.23	Plowed 6"—No cover crop.
1327.03	2179.08	1.18	8.47	Deep plowed (12") 10/24/44—Winter cover crop.
1370.38	4045.27	1.22	14.65	Plowed 6"—Winter cover crop.

—*Harold T. Barr and C. T. Dowell*

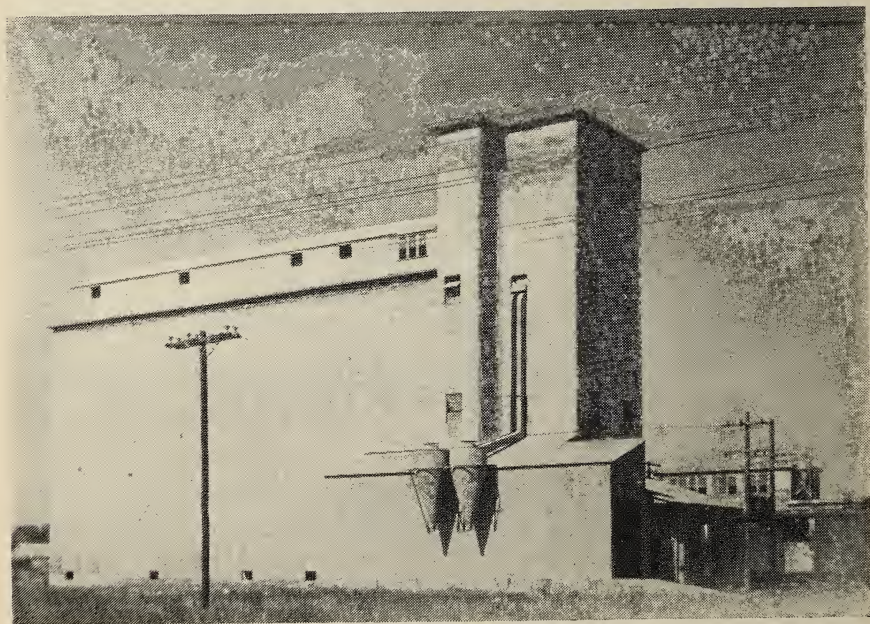
## Rice Storage

Observations made for the past two years on rice stored in steel bins indicate that this material may be satisfactorily used for bin construction, particularly where the steel bin is housed within a steel or other type structure. It is not recommended that rice be placed in any type of bulk storage at temperatures above that of the average atmospheric temperature for that period, because of the tendency for moisture to move away from the warm interior and to accumulate near the colder bin walls. The temperature of rice in storage should be checked frequently, because where an increase in temperature does occur, due to improper condition of the rice, further increases in temperature usually occur at a much more rapid rate.—*Harold A. Kramer.*

## Rice Drying

Data were collected on 79,000 barrels of rough rice dried by the Crowley Rice Drier Co-op, Inc. during the 1945 drying season. The total average number of individual dryings required to dry the different varieties varied as follows: Blue Rose 5.6, Early Prolific 5.6, Nira 4.0, Fortuna 3.3, Zenith 2.8, Rexora 2.6. These data do not necessarily indicate the relative difficulty of drying by variety, as the initial moisture content of the combined rice varied considerably during the season. The average moisture loss by weight for all varieties was 9.5 per cent.

Best milling results were obtained when the temperature of the rice leaving the drier was not allowed to exceed 100 degrees Fahrenheit. This temperature was obtained with a thermometer placed in the rice sample obtained as it was leaving the drier. It was found advisable to limit the time between dryings to a maximum of 12 hours until the moisture has been reduced to 18 per cent or less.—*Harold A. Kramer.*

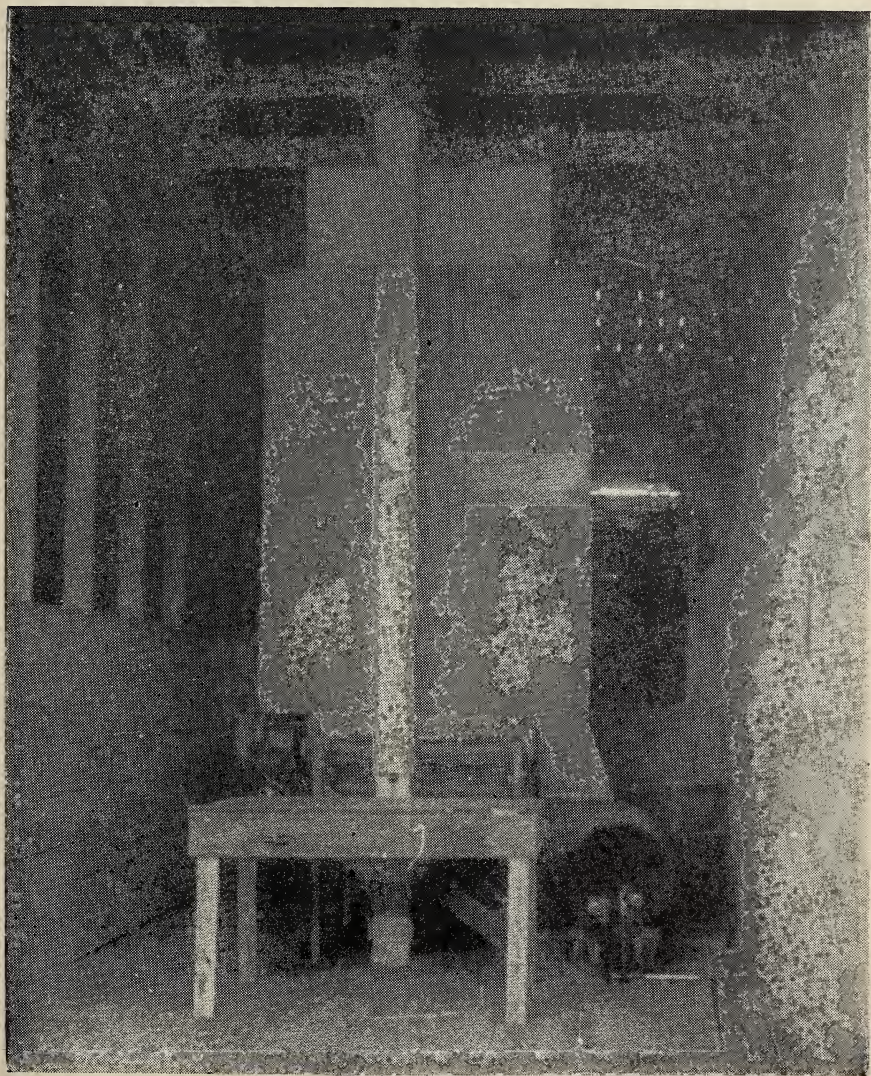


Farmers Cooperative Rice Drying Plant at Crowley



## Oat Drying

Experimental work indicates that the excess moisture in oats, often present at harvesting time, can be efficiently removed by passing the oats through a drier. Usually only one drying period of from 20 to 30 minutes duration is required to bring the moisture down to 14 per cent. Tests showed that the germination of the artificially dried oats was equal to that of other oats.—*Harold A. Kramer.*



Experimental Oat Drier



## Mole Drainage of Sugar Cane Land

Mole drainage of sugar cane land near the Mississippi River has resulted in a lowering of the water table, a more rapid removal of surface runoff, and increased yields of both sugar cane and corn. Sufficient data on life of mole drains and cost of installation are not available to date to recommend their general installation.



Mole Machine, Showing Mole

Both the plow beam dragline bucket, developed last year in connection with this project, and the side sloping bucket are meeting with general approval. Several plantations and earth moving contractors have bought dragline buckets made along these lines.

Grading the cuts to the center with approximately one-foot crown and removing the high mound of dirt on the ditch bank doubled the corn yield in a 24-acre test. Work is now under way to obtain figures on the most economical method of moving the dirt.

This is a cooperative project between the Division of Water Control and Drainage, Soil Conservation Service, U. S. Department of Agriculture, and the Agricultural Engineering Department of Louisiana State University.—*Irwin L. Saveson.*



# *Animal Industry*<sup>1</sup>

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## **Breeding and Selection of Swine For Increased Production**

Six new sows qualified for Production Registry in 1945, representing three separate families. L. E. S. Maxine 6th qualified with two of her daughters and L. E. S. Actina 3 qualified with one daughter. All five of these sows are descended from Wave Queen 7th, 236890, a two-star Production Registry sow. L. E. S. Patrician 44, the latest sow to qualify, is a granddaughter of Golden Wave 111th, 206492, a three-star Production Registry sow. The Duroc herd placed third in the 1945 National Duroc Production Registry contest.

Three young sires, raised in the herd, were used in 1945. These were L. E. S. Top Ace 26, sired by a litter mate to L. E. S. Maxine 6th; L. E. S. Marshall 19th, by the same sire and out of Farmers Best 116, a two-star Production Registry sow; and L. E. S. Fancy King 13, 203689, a litter mate to L. E. S. Fancy Actress 13, a Production Registry gilt out of L. E. S. Actina 3.

These production-bred sows are of excellent type and their pigs usually make rapid gains. Five pigs out of a Production Registry litter from L. E. S. Fancy Actress 13 made high average gains in the summer feeding tests.—*Chas. I. Bray.*

## **Effects of Management and Seeding on Beef Cattle Pastures**

Grazing continued on six experimental six-acre pastures on river bottom land. Gains per acre were lower than in 1944, due possibly to the heavy rainfall during the summer as well as to the increasing growth of grass in proportion to clover. The most important item of interest is the continued decrease in the productivity of the No. 3 pasture which has not been renovated since the pastures were established in 1938. The gains on this lot were only 82.5 pounds per acre compared with 217 pounds per acre on pastures which were disced in 1944. Three out of five heifers on this pasture were losing weight toward the end of the

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<sup>1</sup> See page 116 for report on Animal Industry project at the North Louisiana Experiment Station.

grazing period and were found to be suffering from internal parasites. Field 6, which was plowed two years ago and which made the highest gains in 1944, made lower gains in 1945 than those which had been disced only.—*Chas. I. Bray and S. E. McCraine.*

## Pasture Improvement and Winter Grazing in the Rice Area<sup>2</sup>

Winter grazing was conducted on winter oats, Italian rye grass, and native grass pastures.

Twenty head of steers were grazed on 20 acres of winter oats and made an average gain of 106 pounds each, or 106 pounds gain per acre. Fourteen steers were grazed on 20 acres seeded to Italian rye grass and made 97 pounds gain per head, or a gain of 68 pounds per acre. Twelve steers grazed on 20 acres of native grass pasture containing some clover, made 113 pounds gain per head, or 68 pounds per acre. There was apparently no advantage in seeding with Italian rye grass. Winter oats to be of greatest value should be put in early so as to furnish grazing at a time when there is very little grass.

Fecal examinations made to determine the amount of parasite infestation have been entirely negative, as none of the cattle appear to show any degree of infestation with stomach worms, whether pastured on recently plowed land or on old unplowed pastures.

—*Chas. I. Bray and J. Lane Fletcher.*

## Soybean Meal and Peanut Meal as Protein Supplements for Fattening Pigs

Work has been continued on the feeding value of soybean oil meal and peanut oil meal in various combinations for fattening swine. In a winter feeding experiment, soybean oil meal and tankage produced the best gains, with peanut meal and tankage second and soybean oil meal third. Peanut meal alone was not satisfactory from the standpoint of gains, but as it cost around \$9.00 per ton less than soybean oil meal, there was little difference in cost per pound of gain.

A second test conducted in the summer was planned to compare soybean oil meal and peanut oil meal with and without pasture. Owing to continuous rainfall during the summer, considerable grass grew in the dry lot and consequently there was no difference in the gains. Gains were identical in three of the lots, the peanut meal lot on grass making slightly lower gains. A melting point test on fat samples from some of the barrows showed the peanut meal lots to be slightly softer than the lots fed soybean oil meal.

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<sup>2</sup> In cooperation with Swift & Co., Lake Charles.

In the winter test a fifth lot was fed dried shredded potatoes, dried in a flame drier. One hundred and nine pounds of dried potatoes replaced 88 pounds of corn, giving the dried potatoes a value of 81.5 per cent the value of corn. This lot ate a slightly higher amount of protein supplement.—*Chas. I. Bray and J. L. Fletcher.*

## Fertilized Pastures on Old Rice Land<sup>3</sup>

Two-year old cattle were pastured on six 10-acre, unplowed fields and on one plowed field, limed and fertilized in various ways. There were not enough cattle to keep the grass down, especially on the 1B field; consequently there was not as much difference between pastures as there probably would have been had the lots been completely grazed.

Lot	Treatment	March 29—Oct. 2, 1945			Grade of Cattle at Finish
		No. of Cattle	Gain per Head	Gain per Acre	
Lot 1B	Plowed, seeded, limed, fertilized. ....	7	204	..	1 good, 6 commercial
Lot 1	No treatment. ....	4	197	79	1 commercial, 3 utility
Lot 2	Lime, calcium metaphosphate 100 lb.	7	188	132	2 good, 3 commercial, 2 utility
Lot 3	Superphosphate 300 lb. ....	7	186	130	3 commercial, 4 utility
Lot 4	Lime, complete fertilizer 500 lb. ....	7	225	157	7 commercial
Lot 5	Ca-metaphosphate 100 lb. ....	7	225	157	2 good, 5 commercial
Lot 6	Ca-metaphosphate 100 lb. Muriate of potash 100 lb.	7	172	120	4 commercial, 3 utility

The "commercial" grade was formerly known as "medium" and the "utility" grade was low medium to common.

The above gains appear low but were 40 per cent higher than last year. These gains do not include the gains made on winter pastures before March 29, which averaged around 100 pounds per head. Adding the earlier gains, the cattle put on 305 pounds per head during the grazing season and most of the cattle were in good condition for sale in October. Thirty-two of these cattle were shipped to St. Louis at the end of October and brought \$81.39 per head.

The results are not entirely consistent with those of other years. Lot 2, limed, has previously been the better pasture. Judging by the appearance of the pastures, there was no reason why Lot 5, with calcium metaphosphate alone, should have produced better gains than Lot 2, with lime added, or Lot 6, with potash added, except that the cattle in Lot 5 all made uniformly good gains. Lots 1B and 4, with lime and complete fertilizer, appeared to be the better pastures.

—*Chas. I. Bray and J. Lane Fletcher.*

<sup>3</sup> In cooperation with Swift & Co., Lake Charles.





Grass Fattened Steers on Fertilized Rice Land Pastures

## Raising and Marketing Calves and Yearlings by Various Methods

One group of calves was creep fed on pasture and one group raised on pasture alone. These were all high-grade Herefords. The creep fed calves averaged 426 pounds and the calves on pasture, 358.3 pounds. The appraised price per 100 pounds was respectively \$12.66 and \$11.76, making the total value per head \$53.95 as compared to \$42.64, a difference of \$11.31 in favor of the creep fed calves. These calves were put on feed in dry lot and made an average weight of 588 pounds as compared to 505 pounds. The final values were \$99.23 as compared to \$81.87.

An average of three years of creep feeding shows an average increase in value of \$8.06 per head in favor of creep feeding based on an average increase in price of 98 cents per 100 over the calves on pasture alone. The appraised sale value of the calves at weaning time for three years was \$53.52 for the creep fed calves and \$45.46 for the calves not creep fed.

In 1945 at the end of the winter feeding period, creep fed calves sold at \$103.09 per head as compared to \$82.61. The creep fed calves gained 175.2 pounds as compared to 105.1 pounds of gain for the others, and the difference in selling price was \$1.36 per hundred pounds higher for the calves that had been creep fed.

—S. E. McCraine, Chas. I. Bray and J. B. Francioni.





Creep Fed Calves Finished in Dry Lot Make Good Beef

## Hill Land Pasture Investigations

Results on hill land pastures were considerably better than those made in 1943 and 1944, because of greater rainfall throughout the summer. The improved pastures, particularly those that had been limed, showed to better advantage than in any previous year. Cooperative tests were conducted on the farms of E. C. Parker, Ringgold; D. V. Donaldson, Dry Prong; Richard Fuller, Calhoun; and Murphy Gunter, Forest Hill. The following is a brief summary of results on these different pastures.

### **D. V. Donaldson Farm, Dry Prong**

The best results were obtained on the No. 3 pasture which had been both fertilized and limed with two tons of lime to the acre, the total gains being 203 pounds beef per acre from May 10 to October 26. Pasture 1, which was originally fertilized without lime but which received one ton of lime per acre in 1944, made 165 pounds gain per acre. Fertilized woodland, a small portion of which was limed and which received 100 pounds calcium metaphosphate per acre and was seeded only with lespedeza, produced 123 pounds per acre. An unfertilized field which, however, was not grazed to capacity, produced only a small amount of gain. One herd of cattle was grazed on approximately 1,260 acres of unfertilized woodland pasture. Cattle on this pasture gained 108 pounds per head during the summer as compared to 233 pounds per head on the limed field. Calves on the fertilized fields gained 218 pounds from May to October, while the calves on the unfertilized woodland gained 178

pounds per head and were not in as good condition. Young cows with calves and some very old cows with calves coming off the unfertilized woodland were thin and showed some evidence of mineral deficiency.

While the gains on these hill land pastures are not high, they have been made on low priced land which had been badly run down by long continued cropping. Also, these pastures are grazed to a large extent in late fall and early winter, thus saving considerable expense of winter feeding.



Cows from Fertilized Pastures, Grant Parish, October 1945

### **E. C. Parker Farm, Ringgold**

The same four pastures were grazed as were reported on in 1941 to 1944. Pasture 1, limed and fertilized, has continued to increase in productive capacity, making 386 pounds of gain per acre in 1945, which was much more than was made on our alluvial pasture experiments. Pasture 3, fertilized but not limed, produced 255 pounds of gain per acre; Pasture 4, originally fertilized with basic slag but given a treatment of complete fertilizer in 1945, produced 273 pounds gain per acre. Gains on Pasture 2, the unfertilized pasture, are not included because of a breakdown of the watering system, necessitating grazing on fertilized pasture for a period in midsummer. Up to June 12 this group had made 108 pounds gain to the acre as compared to 180 pounds on the limed and fertilized field adjoining.

### **Richard Fuller Farm, Calhoun**

In this experiment 15 acres of limed and fertilized pasture were compared with 10 acres of seeded but unfertilized land. The 10 acres of unfertilized pasture produced 106 pounds of gain per acre on an average



of 4 mature cattle and 2 calves. The fertilized 15-acre pasture produced 282 pounds gain per acre on an average of 14 head of cattle, including 4 calves.

### **Murphy Gunter Farm, Forest Hill**

The fertilized pasture in this experiment consists of cleared woodland which has been limed and seeded, and fertilized annually with 100 pounds of calcium metaphosphate per acre. In 1945, 100 pounds of muriate of potash were also applied and appeared to improve the pas-



Cows from Unimproved Pasture, October 1945

ture considerably. This fertilized pasture of 20 acres carried about 16 cattle of different ages through the summer, with 3 cows added later and 3 calves dropped on pasture. The gain per acre on pasture was 198 pounds, an average of 220 pounds per head. The cattle on open land gained an average of 128 pounds during the summer period. Calves dropped on fertilized pasture during the summer averaged 282 pounds in October and those dropped on unfertilized pasture averaged 245 pounds.—*Chas. I. Bray, J. Lane Fletcher and J. L. Heath, Jr.*

### **Special Pasture Investigations**

Pasture fertilization tests on Mr. N. L. Moore's farm near Winnsboro in Franklin Parish and on Mr. H. Mitchiner's farm at Epps in West Carroll indicate that the use of calcium, phosphorus, and potash adds profitable production to beef cattle pastures on the soils tested. Clover stands and growth were maintained better on limed areas. An average increase of 155 pounds of beef per acre was obtained from seeded plots receiving lime plus 0-14-7 fertilizer as compared to those not fertilized.

Preliminary results obtained on pasture tests on Mr. H. E. Lyle's farm in Beauregard Parish show that clovers can be grown in the cutover pine lands of that area only when calcium, phosphorus, and potash have been added. During the first grazing season on these tests, 156 pounds of beef per acre were produced on clover-grass pastures which received lime plus 400 pounds of 4-12-8 fertilizer per acre, as compared to only 3 pounds per acre where seeding alone was used. These plots were seeded in November, 1944, and were being grazed for their first season in 1945 and have therefore not reached maximum production. Good grazing was obtained on lespedeza-grass pastures during the first season with the use of 400 pounds of 0-14-7 fertilizer per acre without any soil preparation prior to seeding other than burning native grasses and removing brush and trash. Thorough soil preparation was necessary to secure clover stands.—*D. L. Bornman, Jr.*



# *Crops and Soils*

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## **A Twelve-Month Grazing Program**

In the prairie rice area of southwestern Louisiana rice production and cattle raising are the two most important agricultural enterprises. When the land is not planted to rice, it is allowed to lie idle and grow weeds and grasses which are grazed by beef cattle. This practice has been carried on so long and with so little regard for the maintenance of the fertility of the soil that the yields of rice and beef are too low to support the most profitable agriculture. Research during the past few years has shown that the soils have lost over half of their original amount of organic matter and are low in available nitrogen, phosphorus and potassium. Flooding during the growth of rice and the large surface drainage losses following the removal of the crop increase soil depletion. It is particularly common to find the available nitrogen very low within three weeks after the rice is flooded. In order to provide a high level of available nitrogen throughout the growing period of rice, it was found that increasing the organic matter in the soil could be expected to give the best results. Since there is a shortage of feed for cattle in the area and the production of beef on the extensive unimproved weedy pasture land which is being rotated in rice is somewhat less than 50 pounds of beef per acre per year, obviously the establishment of improved clover and grass pastures would increase the beef production and the rotation of these pastures with rice would restore the soil organic matter. Local observations also indicated that oats planted in early September could be used for supplementary grazing through the winter months.

In order to develop methods for improving pastures and pasture management and to test the value of turning under pasture sods on the improvement of soil fertility, experiments were located in the distinctly different soil areas.

Pasture-rice rotation experiments conducted by the Louisiana Agricultural Experiment Station in three different soil areas of the prairie rice area of Louisiana have shown that a twelve-month grazing program can be developed.

Improved clover-grass-lespedeza pastures have been established on Oberlin silt loam, Lake Charles silty clay loam and Crowley silty clay loam by seedbed preparation, seeding, fertilizing with complete fertilizers

high in phosphorus and potassium, and liming where the pH of the soil is below 6.2. These improved pastures have produced from 172 to 293 pounds of beef per acre during an approximately eight-month grazing period. The yields of the improved pastures exceeded the yields of the unimproved pastures over 150 pounds of beef per acre. The turning under of the improved pasture sods ahead of rice crops in the two experiments that have gone to completion increased the yields of rice 6.4 and 11.1 barrels per acre.

The rotation of improved pastures with rice is definitely the best means found thus far for increasing the yields of rice and for improving the soil productivity of the area.

Supplementary oat and lespedeza pastures rounded out the year-long grazing period and furnished a source of grain and hay which could have further supplemented the mixed pastures during periods of low grazing capacity. The grazing value of the oats as a pasture was 92 pounds of beef per acre during the period from December to March.

When the above practices are fully put to use by the farmers, there will be 40 per cent of the cultivatable land in rice each year, 20 per cent in oats and lespedeza or oats and Alyce clover, and 40 per cent in improved pastures. The adoption of this improved rotation would increase the production of rice on 550,000 acres from 5,830,000 barrels to 8,250,000 barrels. Its adoption would increase the beef production on a like area from 28,000,000 pounds to over 83,000,000 pounds of beef per year. In addition there would be 270,000 acres of winter pastures and a source of grain and hay for winter feeding which would further increase the beef production over 25 per cent. Above all, the fertility of the soils of the area would be improved instead of being depleted.

—R. K. Walker and M. B. Sturgis.

## Cotton Still Louisiana's Most Valuable Crop

During recent years cotton has often been condemned and blamed for the various ills with which agriculture in the South is afflicted. Notwithstanding all the criticism, cotton is still our most valuable crop in Louisiana. In 1945, although the shortest crop in many years, the total value was \$51,500,000. The trouble is not with cotton but with its excessive use in a one-crop system rather than as a crop in a well-balanced system of diversified agriculture.

Cotton is still our most important source of cheap, comfortable clothing, accounting for four-fifths of the textile yardage. There is surely dire need for more cheap clothing in the world at present.

It is well known too that there is great need for more edible fats and oils. The light crop of cotton grown in Louisiana in 1945 produced 4,025,000 pounds of oil.

With the increase in amount of livestock being kept on Louisiana farms, the matter of getting feed is becoming a more serious one. The cotton crop in 1945 furnished in the neighborhood of 15,000,000 pounds of feed in the form of cottonseed meal and hulls, the meal being a very rich protein feed especially valuable for cattle.

There are hundreds of uses for cotton and cotton seed products and new ones are being found daily. Even plastics, which are usually considered competitors of cotton, use about 40,000,000 pounds of lint cotton annually.

It is not that there is no need for cotton but a greater need for growing it in a well-balanced system. We should plant in cotton only land adapted to the crop and that will make a bale to the acre on the average. This can be done because many farmers are now getting such yields. Further, yields may be improved and profits increased by planting only good varieties that are adapted to the locality (See data given in Annual Preliminary Report of Crops and Soils Department.); by the use of more fertilizers where needed; and by the use of disease-resistant strains where disease is prevalent.—*H. B. Brown.*

## Effect of Fertilizers on Cotton Fiber Quality

It has been reported by several research workers that the use of different chemical fertilizers apparently had no significant effect on cotton fiber quality. We have had a suspicion that probably one reason for such findings was to be found in the methods used in the study. As a rule, bolls for study were selected at random in plots in a field fertilizer test where a commercial variety of cotton had been planted. There was usually the probability of considerable variation in the natural fertility of the land used, variation in supply of moisture in the soil, variation in the staple of different plants in the row even where the treatment was the same, and variation in the staple of different bolls on the same plant depending on the part of the fruiting season during which the boll was developed.

In our experimental setup an effort was made to avoid as many of the suspected errors as possible. Thirty-two small plots were laid off, 18 inches of soil from all of these dug up, hauled to a pile, thoroughly mixed, then replaced on the plots. The top soil and subsoil were, of course, kept separate. A pure line strain of cotton was planted, and fiber from bolls from flowers that opened the same day used for comparison. The fiber length was measured with Hertel's fibrograph machine in the fiber laboratory at Knoxville, Tennessee, and the strength of fibers was determined with Pressley's strength tester in the same laboratory.

Our results showed consistent and significant differences between the staple length of fibers from well fertilized and nonfertilized or poorly fer-

tilized plots. There was a difference in some cases of 5.1 thirty-seconds of an inch in the mean staple length and 4.0 thirty-seconds of an inch in the upper half mean. It was observed, too, that there was a very consistent shortening in fiber length as the season progressed. Fiber from bolls developed the second half of the season was 2 to 5.6 thirty-seconds of an inch shorter than that in early season bolls, and was finer and weaker.

The better fertilizers not only induced longer but stronger and coarser fibers and a higher fiber index.—*H. B. Brown.*

## Dallis Grass Improvement and Seed Production

Experiments were continued in 1945 for the purpose of determining the existence of strain differences for seed yields and seed quality in Dallis grass. Seed harvests were made in June, August, and October at Baton Rouge and at Calhoun. The seed were threshed, cleaned, and sampled for analysis. They were analyzed to determine the content by weight of immature seed, viable seed, and ergotized or diseased seed. Total seed yields were somewhat lower in 1945.

The results show striking differences between the strains on test. The value of Dallis grass seed for planting is directly proportional to the content of viable or sound seed. The weight of viable seed per hundred pounds of seed for all strains averaged 21.7 for August, 1944; that is, if all the strains were thrown together and planted, the seed should have produced 21.7 pounds of good seed for each hundred pounds harvested. Since these strains are planted, harvested, and threshed separately, their value was also determined separately. The seed harvested in 1945 were of better quality on the average than was the case the previous year. For August, 1945, the 12 strains under consideration produced 37.1 per cent viable seed by weight as compared to 21 per cent for 1944. The low strain, which was also low in 1944, produced seed 30 per cent of which were classed as viable. The best seed came from a strain with 45 per cent good seed. This strain was high for viable seed content in 1944 and contained 38 per cent viable seed by weight. Seed quality and yield of the strains on test have been as variable at other locations in the state at which the tests were conducted as at Baton Rouge. Certain of the strains appear adapted over a wider area than others. A complete report of the results of the tests conducted at different sections of the state will be published later.

About 250 pounds of seed of two strains were supplied to a number of farmers in the state in the spring of 1945 for seed increase purposes. The yield of seed was not up to expectations, but the majority of the cooperators secured stands and should have good seed yields this year on about 40 acres if 1946 is a favorable season for a seed crop. The method adapted for planting first year increase seed is to plant the seed



in drills of ordinary width as used for cotton at the rate of 5 pounds per acre. Drilling should be done on well-prepared land and on a level, not on beds. This method has proved to be very satisfactory at Baton Rouge. Ordinarily a complete cover of the land by Dallis grass is obtained the second season. Additional seed are being supplied to farmers for the same purpose under the same plan for 1946.

Seed harvests were also made on a progeny test in which 144 progenies were planted in 1944. The seed were harvested in June and August, but insufficient seed were produced in this test after August to harvest, as indicated by the yield of the smaller test. Frequent showers and hot sunshine prevailed at Baton Rouge throughout August and September. The average yield of the progeny test for June was 126 pounds per acre and for August, 141 pounds. Significant differences existed between individual strain and progeny yields in both harvests. The analysis of the seed for the larger harvest is incomplete at this time.—*C. R. Owen.*

## Clover and Lespedeza Improvement

A breeding program for clover and lespedeza was begun in 1945. In this program emphasis will be given to the improvement of white clover, red clover and annual lespedeza. The purpose is to isolate varieties or strains of these crops that will be better suited to production under Louisiana conditions. Attention will also be given to methods of seed production. A large number of selections were made from native stands of these crops last season, and work is underway for planting and testing of the material in 1946.—*C. R. Owen.*

## Effects of Depth of Application on the Loss of Nitrogen From Flooded Soil and on the Yield of Rice

The loss of appreciable quantities of nitrogen by diffusion and volatilization from flooded soil has been found to occur under both laboratory and greenhouse conditions. A study to determine whether placement of fertilizer at greater depth than that ordinarily used in the field would reduce nitrogen loss and thus increase the yield of rice in pot experiments was conducted in the open under a wire cage which prevented damage to the crop by rodents and birds. Crowley silty clay loam from the Louisiana rice area was placed in pots to a depth of seven inches. A complete fertilizer, 800 pounds per acre of an 8-8-8, and varying amounts of nitrogen alone were applied to the soil at depths of one inch and four inches. Rice was planted one inch deep in April and pots with duplicate treatments were left unplanted.

Relatively large quantities of ammonium nitrogen appeared in the flood water in three weeks where 800 pounds of 8-8-8 fertilizer were applied at one-inch depth and rice was not planted. Only small quantities

appeared in the water where the fertilizer was placed four inches deep or where rice was planted with the fertilizer placed one inch deep. In all cases the ammonium nitrogen practically disappeared from the flood water by time of harvest, including those cases where ammonium nitrogen was added to the flood water at the booting stage. The use of 800 pounds of 8-8-8 fertilizer doubled the yields. Placing the fertilizer at the four-inch depth resulted in slightly higher yields of rice than were obtained with the fertilizer at the one-inch depth. Supplemental applications of nitrogen to the flood water did not increase the yield of rice where 800 pounds of 4-8-8 fertilizer were applied at planting. Nitrogen alone applied to the flood water just before the booting stage increased yields by about 22 per cent over those obtained from the checks. In all cases where ammonium nitrogen was applied to the flood water a much darker green color was observed in the plants within three to five days after the application, and this darker color was retained until maturity of the grain. Nitrogen applied to the flood water invariably resulted in a higher protein content of the grain irrespective of its influence on yields. Losses of nitrogen by volatilization were apparently reduced by the presence of the crop and were replaced to some extent by nitrogen contained in the rain water. The reaction of the flood water increased from pH 6.4 to 6.7 during the growing period where rice was planted. Final reactions varying from pH 7.3 to 8.0 were observed where the crop was not planted. The field temperatures for the growing season of 1945 were below the average. This tended to minimize nitrogen losses.—*W. H. Willis and M. B. Sturgis.*

## Sugar Cane Fertilizer Experiments

Sugar cane fertilizer experiments were conducted by the Louisiana Experiment Station on one plantation in each of the following parishes: Lafayette, Iberia, St. Martin, and St. Mary. Fifteen different fertilizer grades were used in each of these tests. The experiments were designed so that each grade or kind of fertilizer occurred at least three times in each experiment, with one fertilizer (40-20-40), and the no-fertilizer, or check, treatment being repeated six times each.

The fertilizer was applied uniformly to each side of the row in the furrow formed by off-barring the cane.

These experiments have not been conducted sufficiently long to justify definite or general fertilizer recommendations. The results obtained, however, indicate that nitrogen can be profitably used at somewhat higher rates than is normally used, and that at the higher rates of nitrogen, the cane will also respond to potash and phosphorus fertilizers.

—*Charles F. Simmons.*

## The Soils Laboratory and its Service to the Farmer

During the past year the Soils Laboratory received 1870 soil samples which have been analyzed and recommendations made to the farmers and the various agencies assisting farmers in collecting the samples. A very large portion of these samples was sent in for recommendations for establishing improved pastures; others were for field crops and a few samples were received for fertilizer recommendations on truck crops and home gardens. In general, these soil samples were distributed over the state. Some samples were received from almost every parish. The areas where the sampling has been more concentrated are the north-western part of the state, the Lafayette area, and the vicinities of Monroe, Ruston, Rayville and Tallulah.

In addition to analyzing samples for farmers, outfield experiments, sugar cane experiments, and pasture experiments have been sampled and the soils analyzed for correlation with field results. Some samples were received for special determinations, such as soluble salt and arsenic contents. These were from the rice area. Not only have these analyses been made, but work has been done on improved methods for available potassium and magnesium determinations.

The soils of the flatwoods areas of the Coastal Plain and the Pleistocene terraces are more acid and have higher lime requirements than any other area of the state. These soils are usually very deficient in phosphorus and potassium.

The soils in the rolling and hilly areas of the Coastal Plain are usually acid, having lime requirements varying from 1,000 to 3,000 pounds of calcium carbonate per acre. There are a few areas, however, that need less lime, some being calcareous. Phosphorus and potassium are also needed in most of these soils.

The soils of the Mississippi River terraces and loessial hills are usually moderately acid and need to be limed. A few calcareous areas are found. The soils are, as a rule, very deficient in available phosphorus and potassium, but there are some areas that need no phosphorus and fewer areas that need no potassium.

About one-third of the soils analyzed in the Coastal Prairies do not need lime, but most of the others are moderately acid. Phosphorus is needed in practically all areas of the Coastal Prairies. Potassium is needed especially in the more sandy areas and in the soils low in organic matter.—*C. W. McMichael and R. H. Brupbacher.*

## Results of Rotation-Fertility Test Indicate the Value of Better Fertilizer Usage and Crop Management

This test was designed to measure the effect of rotations, fertilizer treatments, and winter legumes upon the yields of cotton and corn and on the maintenance of permanent soil fertility. It has been conducted

TABLE 1. YIELDS AND CALCULATED VALUES OF RETURNS FROM FERTILIZERS

Plot No.	Crop and cropping sequence	Fertilizer treatment per acre	1939-1945 7-yr. av. yields of corn and seed cotton	7-year av. annual increases in yield from fertilizer		Cost of fertilizer* per acre	Value of av. increase per acre over cost of fertilizer		Fertilizer cost per unit of increase in yield
				Corn and seed cotton	Value of increase per acre		From corn or cotton	Av. of corn and cotton	
					Dollars	Dollars	Dollars	Dollars	
1	Corn and soybeans continuously.....	No fertilizer	22.5 bu.	continuous check					
2	Cotton continuously.....	No fertilizer	515 lbs.	continuous check					
3	Corn and soybeans continuously.....	300# 6-8-4 annually	36.8 bu.	14.3 bu.	12.64	5.00	7.64	11.50	35c per bu.
4	Cotton continuously.....	300# 6-8-4 annually	787 lbs.	272 lbs.	20.37	5.00	15.37		5.0c per lb. lint†
5 and 6	Corn and soybeans in rotation with Cotton.....	No fertilizer	20.2 bu.	rotation check					
7 and 8	Corn and soybeans in rotation with Cotton.....	No fertilizer	591 lbs.	rotation check					
9 and 10	Corn and soybeans in rotation with Cotton.....	No fert. to corn 600# 6-8-4 to cotton	28.9 bu. 1175 lbs.	8.7 bu. 584 lbs.	7.69 43.74	none 9.99	7.69 33.75	20.72	None 4.7c per lb. lint‡
11 and 12	Corn and soybeans in rotation with Cotton.....	36#N s.d. to corn 600# 6-8-4 to cotton	39.4 bu. 1177 lbs.	19.2 bu. 586 lbs.	16.97 43.89	4.50 9.99	12.47 33.90	23.18	23.4c per bu. 4.7c per lb. lint‡
13	Corn alone continuously.....	Winter leg. to corn 600# 6-8-4 to cotton No fertilizer	32.7 bu. 1132 lbs. 21.4 bu.	12.5 bu. 541 lbs.	11.05 40.52	3.00† 9.99	8.05 30.53	19.29	24.0c per bu. 5.0c per lb. lint‡

\*Cost of fertilizer per acre calculated on the basis of \$33.30 per ton of 6-8-4.

†Estimated cost of seeding with common vetch or Austrian winter peas.

‡Calculated on the basis of a lint percentage of 36.7%. Value of seed not included.



TABLE 2. YIELDS AND CALCULATED VALUES OF RETURNS FROM ROTATIONS

Plot No.	Crop and cropping sequence	Fertilizer treatment per acre	1939-1945 7-year av. yields of corn and seed cotton	7-yr. av. annual increase or decrease from rotations		Cost of fertilizer used over treatment of checks	Value of increase or decrease in yield of crop per acre	Average annual value per acre from rotations
				Corn and seed cotton	Value of increase or decrease per acre*			
					Dollars	Dollars	Dollars	Dollars
1	Corn and soybeans continuously	No fertilizer	22.5 bu.	Not fertilized check		check		
2	Cotton continuously	No fertilizer	515 lbs.	Not fertilized check		check		
3	Corn and soybeans continuously	300# 6-8-4 annually	36.8 bu.	Fertilized check		check		
4	Cotton continuously	300# 6-8-4 annually	787 lbs.	Fertilized check		check		
5	Corn and soybeans in rotation with	No fertilizer	20.2 bu.	-2.3 bu.	-2.03		-2.03	1.83
6	Cotton	No fertilizer	591 lbs.	76 lbs.	5.69		5.32	
7	Corn and soybeans in rotation with	No fert. to corn	28.9 bu.	-7.9 bu.	-6.98		-6.98	11.04
8	Cotton	600# 6-8-4 to cotton	1175 lbs.	388 lbs.	29.06		29.06	
9	Corn and soybeans in rotation with	36# N s d. to corn	39.4 bu.	2.6 bu.	2.30	4.50†	-2.20	13.50
10	Cotton	600# 6-8-4 to cotton	1177 lbs.	390 lbs.	29.21		29.21	
11	Corn and soybeans in rotation with	Winter leg. to corn	32.7 bu.	-4.1 bu.	-3.62	3.00‡	-6.62	9.61
12	Cotton	600# 6-8-4 to cotton	1132 lbs.	345 lbs.	25.84		25.84	
13	Corn alone continuously	No fertilizer	21.4 bu.					

\*The value of cotton and corn was calculated from the average prices during 1939-45 of 7.49 cents per pound of seed cotton (36.7% lint) and 88.4 cents per bushel of corn.

†Cost of 36 pounds of nitrogen per acre calculated on the basis of \$40 per ton of nitrate of soda.

‡Estimated cost of seeding with common vetch or Austrian winter peas.

for seven consecutive years on Olivier silt loam at Baton Rouge. Although the results obtained will depend upon the duration of the test, since the levels of soil fertility of the different plots can be expected to change to some extent as the test is continued, the results obtained to date provide some interesting information.

### **Returns from Fertilizers Increased by Better Crop Management and Fertilizer Usage**

The seven-year average yields obtained from 1939-1945, inclusive, together with the estimated value of the returns from fertilizers are given in Table 1, page 46.

The data for the seven-year average yields show that application of 300 pounds per acre of a 6-8-4 fertilizer to corn and soybeans grown continuously gave an increase of 14.3 bushels of corn per acre. Similarly, a 300-pound-per-acre application of a 6-8-4 fertilizer to cotton grown continuously gave an average increase in yield of 272 pounds of seed cotton per acre.

When the cotton was grown in rotation with the corn and soybeans and all the mixed fertilizer, i.e., 600 pounds per acre, was applied to the cotton (Plots 7 and 8), the average annual increase in yields was 584 pounds per acre of cotton and 8.7 bushels of corn. The yields of other rotations in which (1) a side-dressing of 36 pounds per acre of nitrogen as nitrate of soda is applied to the corn and soybeans (Plots 9 and 10) and (2) winter legumes are turned under before the corn and soybeans (Plots 11 and 12) are also shown. These yields and the accompanying data on the value of the average increases in yield over the cost of fertilizer and on the fertilizer cost per unit of increase in yield show the comparable returns from the different crop and fertilizer practices.

### **Returns from Rotations Improved by Good Fertilizer Practices**

The yields and data on the value of returns from the rotations are given in Table 2, page 47.

The data in Table 2 show that when fertilizers were not used the rotation of cotton with corn and soybeans as compared to continuous cropping gave an increase of only 76 pounds per acre of seed cotton and a decrease of 2.3 bushels per acre of corn. These changes in yields are due to the fact that in the rotation the cotton gets the first year's benefit from turning under the soybeans. The net average annual value derived from the rotation was only \$1.83 per acre.

When fertilizers were used, rotation proved to be of considerably more value. In the rotation where all the fertilizer, i.e., 600 pounds of a 6-8-4 per acre, was applied to the cotton (Plots 7 and 8), an average increase of 388 pounds per acre of seed cotton and a decrease of 7.9 bushels per

acre of corn were obtained. This rotation gave net annual returns of \$11.04 per acre. Where an additional 36 pounds of nitrogen per acre were applied as a side-dressing of nitrate of soda to corn (Plots 9 and 10), average increases in yield of 390 pounds per acre of seed cotton and 2.6 bushels per acre of corn were produced. The average annual value of these increases at the average prices is \$13.50 per acre. The use of winter legumes as a source of nitrogen for corn at Baton Rouge (Plots 11 and 12) has not proved to be as good as side-dressing. This is ascribed to the facts that (1) the winter legumes have not made an optimum growth of green matter at the time they are turned under before corn and (2) insect infestation and damage to the corn are nearly always higher following the turning under of winter legumes and this has frequently necessitated enough replanting of the corn in these plots to affect the yield some years.

Thus the data show that although a complete fertilizer was necessary for the best yields of corn on this soil, (1) the yields were not seriously reduced by growing corn in rotation with cotton where all the mixed fertilizer was applied to the cotton, and (2) the yields of corn in the fertilized rotation were increased by applying a side-dressing of supplemental nitrogen to the corn. It also appears that the best yields and returns of corn and cotton grown in rotation depend upon the proper and adequate use of fertilizers for the crops.—*Franklin L. Davis.*

## Long-time Fertilizer Tests Give Information on Changes in Soil Fertility

Field experiments of long duration are useful for studying and measuring the small but eventual effects that long continued fertilizer and cropping practices have upon soil fertility. The results of field experiments of only a few years' duration provide information on the nutrient deficiencies of soils for the crops grown. However, the use of fertilizers or other soil amendments affects not only the immediate productivity of soils but also their eventual fertility level. As the result of the accumulation of some fertilizer constituents in the soil and the accelerated removal of other nutrient elements by the increased crop growth, or by leaching from rain, fertilizers have a residual effect upon soil fertility. Such residual effects may include (1) an increase or decrease in soil acidity, (2) a building-up of the phosphorus supply in the soil, (3) a decrease in organic matter content, (4) changes in tilth or physical condition of the soil, and (5) changes in the level of availability of all the known nutrient elements. Accompanying these changes are the effects that crop sequences and cultural practices exert upon the improvement or decline in soil fertility. Some information on the extent to which such changes occur in the fertility of an Olivier silt loam soil is furnished by the data and results given in Table 1, page 50.

TABLE 1. RESULTS OF COTTON FERTILIZER RATIO TEST ON OLIVIER SILT LOAM, PERKINS ROAD FARM, BATON ROUGE, LOUISIANA

Plot No.*	Pounds of plant food applied per acre† N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O	Yield in pounds of seed cotton per acre									Average increase aver. checks
		1938	1939	1940	1941	1942	1943	1944‡	1945	8-yr. av.	
1	30- 0-24	917	476	269	424	250	38	249	48	334	— 5
2	30-24-24	1501	938	738	1146	1078	636	1226	828	1011	672
3	30-36-24	1538	1045	828	1224	1054	916	1415	960	1123	784
4	30-48-24	1622	1224	910	1209	1018	1044	1460	1070	1195	856
5	30-60-24	1704	1238	994	1274	964	1109	1613	1063	1245	906
6	0- 0- 0	903	443	203	330	250	105	323	110	333	check
7	0-48-24	1374	851	583	706	326	688	929	470	741	402
8	18-48-24	1411	945	735	930	635	871	1179	798	938	599
9	24-48-24	1444	983	741	954	629	949	1410	958	1009	670
10	30-48-24	1521	1000	806	920	686	895	1373	936	1018	679
11	36-48-24	1666	1193	881	1085	975	1001	1521	1038	1170	831
12	42-48-24	1717	1129	1016	1150	1119	1014	1416	1025	1200	861
13	0- 0- 0	917	474	209	335	340	76	340	70	345	check
14	30-48- 0	1471	765	820	1020	908	334	938	476	842	503
15	30-48-12	1571	978	855	1178	1175	761	1088	785	1049	710
16	30-48-24	1657	1048	868	1174	996	988	1363	988	1135	796
17	30-48-36	1678	1125	880	1176	998	1043	1485	1054	1180	841
18	30-48-48	1716	1148	1009	1235	856	1071	1433	993	1183	844

\*Four series or replications of plots.

†Nitrate of soda, superphosphate and muriate of potash were used as the sources of nitrogen, phosphoric acid and potash, respectively.

‡Austrian winter peas were planted on all plots in the fall of 1943 and turned under in the spring of 1944

The data on growth of green matter and nitrogen content were given in the Annual Preliminary Report of the Department of Crops and Soils for 1944.

The soil on which this test is located is part of an old field that had not been cultivated for a number of years prior to 1938 and had been allowed to grow up with broom sedge and lespedeza. It is old, cultivated land whose native fertility had been largely exhausted and is considered as being representative of much of the Olivier silt loam that constitutes a large percentage of the terrace soils of East Baton Rouge Parish.

The results show that 48 pounds of phosphoric acid per acre produced close to the maximum yields and that 36 to 42 pounds of nitrogen per acre can be used. Twelve to 24 pounds of potash per acre were sufficient to produce good yields of seed cotton most years, but the cotton on the plots receiving only 12 pounds per acre was difficult to pick and appeared to be of poor quality. The prevalence of leaf spot and mild rust-like condition of the cotton during the 1944 and 1945 seasons indi-



cate that a potash deficiency is developing on the plots receiving 48 pounds per acre of  $P_2O_5$  and only 24 pounds per acre of  $K_2O$ .

The yields on Plot No. 1 show that supplying phosphorus is essential in increasing the yield of cotton on this soil. Even when 30 pounds of N and 24 pounds of  $K_2O$  per acre were supplied, the yields were no larger than those of the unfertilized check plots (Nos. 6 and 13).

The yields obtained in 1942 show that excessive rains during the growing season seriously affected the utilization of the fertilizers applied. Although the plants made a rank growth and boll weevils did but little damage, the plants fruited poorly. The soil was kept soggy and the plants shed many small bolls. As a result, the yields from the different levels of nitrogen differed more than in any other year. Furthermore, both the 24-pound-per-acre application of  $P_2O_5$  (Plot No. 2) and the 12-pound application of  $K_2O$  (Plot No. 14) produced yields as large as or larger than those obtained from the heavier applications.

The data also show the rapid decline in yields that results from continued cropping without the use of fertilizers or soil-building crops (Plots Nos. 6 and 13). With the exception of the year 1942, the differences between the yields obtained from the successively larger applications of all three nutrients—N,  $P_2O_5$  and  $K_2O$ —tended to increase each year. In other words, the yield on the poorly fertilized plots, whether the inadequately supplied nutrient was nitrogen, phosphorus, or potassium, decreased more rapidly than did the yields on the better fertilized plots where all three nutrient elements were supplied in adequate amounts.

The yields obtained in 1944 following the winter legumes indicate that the gradual decline in yields might be due to a depletion of soil organic matter. This was partially substantiated by the fact that, while larger yields were obtained following the use of the green leguminous manure, the actual yields obtained on Plots Nos. 7 to 12 were much more closely correlated to the amounts of nitrogen supplied in the fertilizer than they were to either the amount of green matter turned under or to its content of nitrogen.—*Franklin L. Davis.*

## Out-Field Work

### Oat Fertilization Experiments

In experiments conducted on Miller very fine sandy loam soil in Red River Parish and on Yahola very fine sandy loam soil in Caddo Parish the highest yields were obtained by applying 300 pounds of 5-8-8 under oats before planting in the fall and top-dressing with 45 pounds of nitrogen about March 1. In an experiment on Portland very fine sandy loam soil in Ouachita Parish, the application of 60 pounds of nitrogen as a top-dressing on March 2 gave the highest yield. Other experiments were conducted in Franklin Parish on Olivier silt loam soil and in Red River Parish on Cahaba fine sandy loam soil.

## **Corn Fertilization Experiments**

On a Lintonia silt loam soil in St. Landry Parish the use of 300 pounds of 5-8-8 under corn before planting and a side-dressing with 45 pounds of nitrogen gave the highest yield in an experiment where there was a heavy growth of interplanted soybeans. Somewhat similar results were obtained on an Olivier silt loam soil in St. Landry Parish, but the yield of corn was limited by very wide spacing and a very heavy growth of interplanted soybeans. Other experiments were conducted in St. Helena, Caddo, Claiborne, Morehouse and Red River Parishes.

## **Corn Variety and Hybrid Corn Experiments**

In an experiment in St. Helena Parish the best Louisiana hybrid, No. 520, outyielded the best open-pollinated varieties, White Tuxpan and Cocke's Prolific, by 40 per cent. In Claiborne Parish the best Louisiana hybrids were Nos. 1030 and 476, which gave 20 per cent higher yields than Cocke's Prolific, the highest yielding open-pollinated variety. In both experiments the Louisiana hybrids outyielded other hybrids which were included.

## **Cotton Fertilizer Experiments**

In Morehouse Parish on a Portland very fine sandy loam soil, 500 pounds of 8-8-8 fertilizer produced the highest yield, which was 1,000 pounds per acre more than was produced without fertilizer. In Claiborne Parish on a Ruston sandy loam soil, 500 pounds of 8-12-8 gave the largest yield. In this experiment there was but little increase from the use of nitrogen and potash where no phosphate was used. On Lintonia silt loam soil in St. Landry Parish 500 pounds of 8-8-12 produced the highest yield. Other experiments were conducted in St. Helena, Caddo and East Carroll Parishes.—*F. A. Peevy and W. J. Peevy.*

# Dairy Research<sup>1</sup>

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## Mt. Hermon Pasture Yields 6,000 Pounds Milk Per Acre

Cows grazing on the B. P. Alford experimental pasture near Mt. Hermon produced in 1945 milk equivalent to 6,000 pounds for each acre grazed. This milk was valued at \$210. Deducting from this \$72, the cost of the grain supplement fed, left an average of \$138 per acre over and above feed cost. The fertilizer bill based on an application every second year averaged \$8 per acre yearly. When this also is deducted from the value of the milk there remains \$130 as return for labor, interest on investment, profit, etc.

Samples of herbage clipped from protected areas within the Alford pasture showed yields that averaged 4.06 tons of air-dry hay per acre. Areas of the pasture that had been rebroken and reseeded in the fall of 1943 averaged 5.18 tons, while that not broken, but otherwise treated the same, averaged 3.52 tons per acre. Likewise, the area that had been renovated produced herbage that analyzed 10.7 per cent protein as compared to 9.2 per cent for that not renovated, and the calcium showed a similar trend, 0.80 per cent, as compared to 0.76 per cent. More clover was in evidence on the renovated areas than on those not renovated, which probably explains the higher yield and the higher content of protein and calcium.—*D. M. Seath and L. L. Rusoff.*

## Mineral Deficiencies of Louisiana Dairy Herds

One phase of the controlled mineral feeding experiment with dairy heifers and cows has been terminated. This involved the supplementation of the basal ration of native grass hay, cottonseed meal or blood meal, corn and salt with calcium (oyster shell flour), phosphorus (disodium phosphate) and both calcium and phosphorus (steamed bone meal).

The various groups of animals on experiment were not allowed any pasture, native grass hay being their only source of roughage. Thus, the animals were subject to rigorous conditions. The physical condition of all the cows, whether receiving mineral supplementation or not, was poor to mediocre, except for a month or two before calving.

Mineral supplementation of calcium or phosphorus or both these minerals to the basal ration did not appear to be the only limiting fac-

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<sup>1</sup> See page 117 for report on Dairy Research at the North Louisiana Experiment Station.

tor involved when growth, body weights, and milk and fat production were taken into account. Also, blood calcium and inorganic phosphorus analyses, reproduction data, and general condition of the animals showed no significant differences between the groups of cows.

—*L. L. Rusoff and D. M. Seath.*

## Dairy Cattle Inherit Tolerance to Heat

Studies on the reaction of Jersey and Holstein cows to warm weather during 1944 and 1945 gave convincing evidence that the ability of dairy cows to tolerate heat is hereditary. First, it was found that Jerseys, as a breed, did not show as large an increase in body temperature due to hot weather as did Holsteins. Second, and more significant, it was found that the daughters of certain sires of each breed were more tolerant to heat than were those by other sires. This trend was present for both of the two years studied, for the rank of the seven sires based on the heat tolerance of their daughters was, with one exception, the same for 1945 as for 1944.

Results from this study would give encouragement to a dairyman attempting to increase the heat-tolerance ability of his dairy cattle by breeding and selection within a given dairy breed without bringing in outside blood such as that from the Brahman.

—*D. M. Seath and G. D. Miller.*

## Night Grazing Greatly Increased in Hot Weather

Constant observation of three Jersey and three Holstein milking cows during one week in the summer of 1945 showed that the cows averaged less than two hours grazing during daytime periods on warm days; but they endeavored to make up for this by extended grazing periods at night. During two relatively warm days the grazing periods between morning milking and evening milking were 1.9 hours for one day and 1.8 hours for the other. The remainder of this daytime period was spent in the shade. Night grazing for these days averaged 5.7 hours and 5.5 hours, respectively, or more than three times the length of time grazed in the daytime.

Grazing time on two relatively cool days was 2.4 times as much in the daytime as during the relatively warm days; and on the cool days the grazing time for the 24 hours averaged more than one hour longer than for the warm days.

Cows averaged for all days studied 1.4 grazing periods during the daytime and 2.7 periods during the night. Three grazing periods were the most common at night, and the time spent grazing averaged 5.5 hours, while 3.5 hours were spent lying down and 0.7 hours were spent standing without grazing.



Results of the study suggest the need for good pasture at night and, especially on warm days, for an excellent daytime pasture which will permit cows to become filled prior to the time that they seek comfort in the shade. Likewise, the results show a need for testing the value of furnishing supplemental feed such as hay to cows during their long periods in the shade.—*D. M. Seath and G. D. Miller.*

## How High Humidity and High Temperature Affect Dairy Cows

High relative humidity appears to be of minor importance when compared to high atmospheric temperature as a factor contributing toward the discomfort of cows in summer months. This was the conclusion drawn from a study made of Jersey and Holstein cows at Louisiana State University during the summers of 1944 and 1945.

For each of the two years the correlation between humidity and respiration showed that as relative humidity increased, the respirations dropped a very little. The correlations were therefore negative,  $-.06$  and  $-.02$ . These relationships are too small to have much significance, for a perfect correlation is either  $+1.0$  or  $-1.0$ . All relationships were measured after removing effects due to herd, breed, and changes in air temperature. Correlations between humidity and body temperature of cows were positive each year,  $+.16$  and  $+.10$ , thus showing that a very small average increase in body temperature took place in step with increases in humidity. However, humidity and pulse (heart rate) showed small negative relationships one year and small positive ones the other year, indicating no definite trend.

Increases in air temperatures caused significant increases in body temperatures of cows, in pulse rates and in their respiration rates. Correlations measuring the air temperature and body temperature relationships were  $+.67$  for 1944 and  $+.53$  for 1945. For air temperature and pulse it was  $+.20$  and  $+.16$ . It was higher for air temperature and respiration,  $+.75$  and  $+.35$ .

The size of these correlation coefficients indicates quite definitely that it is high atmospheric temperature and not high humidity that is largely responsible for the discomfort of cows in summer months.

—*D. M. Seath and G. D. Miller.*

## Manure and Commercial Fertilizer Produced Good Pasture at DeRidder

Application of barnyard manure caused increases in growth of seeded pasture averaging 84 per cent in 1944 and 83 per cent in 1945. These were the results from the pasture test on the Fred Tenney Dairy Farm, DeRidder, Louisiana, which consisted largely of white Dutch clover

seeded in October of 1943. The increases in yield due to manure were shown in comparisons of clippings made during late April of each year. Highest average yields were secured from areas treated with lime, potash, and phosphate in combination with manure.

Plots receiving no fertilizer had the lowest yields, 0.66 tons of air-dry hay per acre in 1944 and 0.46 tons in 1945. Manure increased these yields to 1.28 and 1.51 tons for the respective years. During 1944 the highest average yield, 2.33 tons, was secured from the plots receiving manure, lime, phosphate, and potash. In 1945 the plots treated with manure plus phosphate were highest, with 1.41 tons per acre. Only one fertilization of the plots was made and that took place in the fall of 1943 when the comparative applications were made, using 5 to 7 tons of manure, 1 ton of lime, 300 pounds of 20 per cent phosphate and 100 pounds of 48 per cent muriate of potash per acre. Yields of clover during the second season (1945) averaged approximately one-third less than that for the first season (1944).

Analyses of clippings taken from the experimental pastures showed marked increases in the protein and mineral percentages due to fertilization. Highest values were shown for areas treated with manure, lime, phosphorus, and potash. As an example, the analyses in 1945 showed that treatment with manure had increased the protein content by 13 per cent, the calcium by 7 per cent, and the phosphorus by 22 per cent over that shown by areas otherwise treated the same.

Among plots not receiving manure best results were secured when the full commercial fertilizer treatment was used, namely, lime, phosphate, and potash. Differences in results due to variations in the original seed-bed preparation were also found. The thoroughly prepared seedbed, including plowing, disking, harrowing, and packing, proved best. Next best was the use of disk rather than the plow in breaking the sod.

—D. M. Seath, L. L. Rusoff, and A. D. Fitzgerald.<sup>2</sup>

## High Quality and Early-cut Hay Best Feed For Dairy Cattle

Four digestion trials have been completed which show that high quality hay, especially that which is cut early, has high percentages of protein and total digestible nutrients.

The digestion trials, in which four dairy steers were used, determined the feeding value of late-cut native grass hay, common or Japanese lespedeza hay (*Lespedeza striata*) cut in the bloom and early-seed stages, and Alyce clover hay.

The native grass hay contained about 90 per cent carpet grass, with the remainder mostly sedge grass, and was obtained from Tangipahoa

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<sup>2</sup> County agricultural agent at DeRidder.

Parish, as was the Alyce clover hay, 95 per cent pure. The two lots of common lespedeza hay were obtained from the George Gayden farm in East Feliciana Parish. This hay contained approximately 20 per cent foreign material, including grass, weeds, and oat stubble. The composition of crude (total) protein was lowest for the native grass hay, 6.61 per cent, and highest for the Alyce clover hay, 12.26 per cent. Crude protein content of the common lespedeza hay was in between the above range, 10.52 per cent for the bloom stage and 8.55 per cent for the early-seed stage.

The digestible protein as determined by the trials was also lowest for the native grass hay, 2.14 per cent; the common lespedeza hay had 5.01 per cent for the bloom stage and 3.33 per cent for the early-seed stage; and the Alyce clover hay had the highest digestible protein, 7.52 per cent.

The total digestible nutrients were in the same order as that for the percentage of digestible protein, namely, native grass hay 40.03, common lespedeza hay at bloom stage 50.06, common lespedeza hay at early-seed stage 48.28, and Alyce clover hay 55.58.

—*L. L. Rusoff, D. M. Seath and G. D. Miller.*

## **Complete Fertilization Produced Best Pasture at Bogalusa**

Barnyard manure and potash fertilizer, or both, when used in combination with lime and phosphorus, caused marked increases in pasture growth and nutritive value as compared to pasture herbage from areas treated with only lime and phosphate. These results were secured in 1945 from the dairy pasture experiment on the H. N. McEwen farm near Bogalusa, Louisiana, and are similar to those secured in 1944.

The lime and phosphate treatment resulted in yields averaging 3.66 tons of air-dry hay per acre, while this basic treatment when combined with barnyard manure or potash, or both, resulted in yields averaging from 5.12 to 5.55 tons per acre. The protein and mineral content of the pasture herbage also showed increases wherever the more complete fertilization took place. The protein produced on one acre of these most productive pasture areas averaged 1,140 pounds, or an amount equivalent to that in 28 sacks of cottonseed meal. This resulted from a yield of more than five tons of hay per acre with an average protein content of slightly over 11 per cent. This protein yield was almost double that from areas treated with only lime and phosphate. In like manner, the calcium yield per acre increased from 44 to 82 pounds and the phosphorus from 25 to 48 pounds per acre.

Increases in the yields of the various nutrients can be explained by the better stands of clover and Dallis grass found on the areas receiving the more complete fertilizer treatment.—*D. M. Seath and L. L. Rusoff.*

# Entomology

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## DDT-Nicotine Combination Effective Against Cabbage Worms

The problem of controlling worms on cabbage and related crops is complicated by the fact that a very small amount of harmful residue is allowed to remain on the harvested product. This implies that insecticides used to combat these pests must be non-poisonous to man, or used only on the early stages of growth before edible portions of the plants are developed. In the latter case the insecticide would have to be strongly adhesive and long lasting in effect so as to give continued protection to the plants during the final and critical period of growth and maturity. With these requirements in mind, a series of experiments was conducted during 1945, the purpose of which was to develop an insecticide or a combination of insecticides for cabbage worm control.

A DDT-nicotine dust mixture gave an almost perfect control of these caterpillars. Infestation counts showed that the DDT-nicotine treated plants contained but slightly more than 1 per cent as many worms as did the plants on the check plots. The rotenone-nicotine gave a fairly satisfactory control though considerably inferior to the DDT-nicotine. While it gave a slight reduction in the worm population, nicotine alone was unsatisfactory.—*C. E. Smith, T. C. Barber and T. P. Dutsch.*

## The Sand Wireworm Can Be Controlled with Crop Rotation and Sound Cultural Practices

Sand wireworm studies at Ringgold, Bienville Parish, were continued during 1945, with two lines of investigation being followed. One was looking into the possibility of control by the use of chemicals, and the second and most practical line consisted of cultural practices, including crop rotations, cover crops, fertilizations and the growing of improved varieties of crops.

In the early studies it was found that a number of legumes and cereals could be grown successfully on these wireworm infested soils; also, that the plowing under of winter cover crops improved not only the stands but also the quality and quantity of summer crops. Consequently, in 1944, a long-range rotation program was initiated. The rotation includes tests of nearly every economically important crop adapted to the section; both hay and cover crops for the winter months, and summer crops for feed and cash purposes. Each crop follows another in a rotation which widely separates those crops most susceptible to wireworm attack.



During the spring of 1945, heavy crops of oats and vetch combined, oats alone, Singletary peas, Austrian winter peas, and crimson clover were harvested from their respective plantings. A total of 36 large 2-horse wagon loads of hay were harvested from slightly less than eight acres.

During the summer of 1945, good crops of peanuts, sweet potatoes and corn were harvested. A total of 45 bushels of corn (La. 468) was harvested from slightly over one acre, a heavy yield for the locality. Two good hay cuttings were made from the planting of Sudan grass, and two fair cuttings from the area planted permanently to *Lespedeza sericea*. Soybeans gave indifferent results, since they were very patchy and uneven in growth, apparently because of lack of seed inoculation. *Crotalaria spectabilis* germinated rather poorly, but developed into large uniformly blooming plants.

As a result of the soil improvement program maintained over the past several years, the experimental field has shown a substantial recovery from the depleted condition of a few years ago. The crops harvested during 1944 and 1945 greatly exceed, both in variety and quantity, the average of crops grown in the surrounding vicinity. Also, the wireworm population of the field has been greatly reduced, it now being quite difficult to find specimens in the previously most heavily infested portions of the field.

### **Chemical Control of the Sand Wireworm Ineffective**

Attempts to evolve a practical control of the sand wireworm by use of soil fumigants and other chemicals have been unsuccessful to the present time. The studies during 1945 consisted of tests with different concentrations of DDT dust, DD emulsion, ethylene dichloride emulsion and several proprietary preparations. None gave promising results.

—T. C. Barber and C. E. Smith.

### **Velvetbean Caterpillar on Soybeans Can Be Controlled with DDT or Cryolite**

During 1945 studies on the control of the velvetbean caterpillar by the use of insecticides were continued. They consisted of small plot tests in which the relative effectiveness of several different insecticidal mixtures and different times of application were compared; and also some practical field dusting with powered ground dusters and airplanes.

The results showed that DDT is slightly better than cryolite in controlling this insect, especially being longer lasting in effect. This was demonstrated in the different date of application tests in which the insecticides were applied August 28, September 3 and 10. The cryolite treatments yielded 1.6, 1.43 and 1.49 bushels more soybean seed than did the check, whereas the DDT (3 per cent) yielded 6.05, 4.26 and 3.05 bushels more than the check. These results also showed that the earlier

the applications, the better were the results, especially in the DDT treatments.

The results of the practical field dusting showed that one application of either cryolite or DDT properly timed will control this caterpillar adequately; and about September 1 is the best time to make the applications in the seed producing area of Louisiana. Therefore, it appears at this time that the most practical treatment for the control of the velvetbean caterpillar is: Make an early application of DDT or cryolite just as soon as the infestation is sufficient to justify dusting, and a second application later, if and when there is sufficient reinfestation.

—A. L. Dugas and C. E. Smith.

## **It Paid to Dust Cotton for Boll Weevil Control in 1945**

The control of the boll weevil is an essential farming practice, as was demonstrated over practically the entire state in 1945. Weather conditions, especially the frequent and excessive rainfall that occurred during July and August, were favorable to the boll weevil, making poisoning necessary. Although considerable poisoning was done, a large percentage of the cotton crop was not protected against the ravages of these insects. This was due to several factors, including shortages of dusting machinery and nicotine (many growers will not apply calcium arsenate without nicotine for the control or prevention of aphid build-up), frequent rains, etc.

As demonstrated in numerous instances observed, it is under unfavorable conditions such as those prevailing in 1945, that it is most profitable to apply insecticides for the control of cotton insects. One striking example was observed in Rapides Parish where one grower made 10 applications of calcium arsenate (two of which contained nicotine for aphid control) on his cotton, whereas a neighbor just across a turn row and ditch made one application and quit on account of the rains. The yields of the former averaged over 625 pounds of high-grade lint-cotton per acre, and the latter made about 500 pounds or less of seed cotton of low quality. Many other similar or parallel cases were observed. Total to near crop failures where no poisoning was done were numerous.

### **Nicotine in Dry Concentrate Powder Form Is Effective in Preventing Build-up of the Cotton Aphid**

Studies designed to find a more satisfactory insecticide or insecticidal mixture to replace the old standard, and somewhat objectionable, calcium arsenate-nicotine (liquid sulphate) mixture for boll weevil and aphid control were continued during 1945. These studies were centered largely on a new non-volatile dry concentrate powder form of nicotine and, to a less extent, on other chemicals, especially new forms of arsenicals that were thought might control the boll weevil and not induce aphid build-up.

The results of these tests showed that in all cases where the cotton aphid infestation was sufficiently heavy to materially affect the yield, the dry concentrate treatments consistently out-yielded the liquid sulphate treatments. This applied also in the tests of different concentrations of the two forms of nicotine, being more pronounced in favor of the dry concentrate in the weaker concentrations. In one experiment, the average yield of seed cotton for all of the dry concentrate treatments was 2,339 pounds per acre compared to 2,199 pounds of seed cotton per acre for the liquid sulphate treatments.

The results of the experiment testing different arsenical preparations showed that the aphid build-up closely paralleled the toxicity of the materials to the boll weevil. In other words, the more toxic a material was to the boll weevil, the greater was the aphid build-up.

—*T. P. Dutsch, T. C. Barber, J. L. Crigler and C. B. Haddon.*

## **Sugar Cane Borer Control**

The efficacy of cryolite dusting for borer control has been proved, and the practice is fairly well established as a practical control. In 1945, investigations were continued with the view of finding means of increasing the effectiveness of cryolite, and perhaps, finding a cheaper material equal to or better than cryolite.

The question of where the borers are killed by the poison seemed significant. Therefore, a test was conducted to study the mortality of various instar larvae at different locations on the plant—on the leaves, in the bud, and in the leaf sheaths. The results showed that an insignificant number of larvae were killed on the leaves. In comparison, a large number were found dead in the bud of the plant, and a rather small number in the leaf sheaths. These findings dispute the argument for a highly dustible material to assure complete coverage of the leaves, as might be desired in the control of some other pest. A somewhat heavier dust more likely to find its way down into the bud and leaf sheath would seem more desirable. Highly conditioned cryolite dusts were found to be less effective than the regular material.

Five and 10 per cent DDT dusts were compared with cryolite in several borer tests. DDT accounted for increases in borer infestation in all cases, probably because of its toxic effect on *Trichogramma* and the predators of the borer. In the study mentioned above, about 25 per cent more borers were found present in the DDT plots than in the cryolite or check plots.

## **Large Scale Field Application of Cryolite Dusting for Borer Control Studied for Three Years**

An extensive study of the field application of cryolite dusting to control borers on numerous plantations, over a three-year period, has yielded some significant results. These may be summarized as follows:

1. The logical application of this dusting should embrace the whole community.
2. All of the infested cane on each plantation and in the community should be dusted for first generation control. Smaller areas showing up later should be cleaned up with second-generation dusting.
3. Dusting of all of the infested area prevents reinfestation and results in a more successful harvesttime control.
4. There was considerable decrease in the amount of dusting necessary on a given plantation from year to year. One heavily infested plantation required no dusting after two years.
5. Summer planted cane increases the amount of dusting required and intensifies the borer problem.
6. Successful field application required extensive field observation to determine the proper time to start dusting and the areas sufficiently infested to justify dusting.
7. Finally, cryolite dusting is a good, practical control for the borer and should be adopted along with other control recommendations.

### **Sodium Fluosilicate Proves More Toxic Than Cryolite to the Borer**

In view of the promising results obtained with 50 per cent sodium fluosilicate in the fall of 1944, numerous tests were conducted in 1945 to compare the toxicity of cryolite and sodium fluosilicate against first and second generation borers and borers in summer plant cane; to study the relative effectiveness of various concentrations of sodium fluosilicate; and to evaluate the different brands of sodium fluosilicates for borer control.

Of 20, 30, 40, 50, and 75 per cent sodium fluosilicate dusts, the 50 per cent was found to be the desired strength, based on effectiveness, dustability and cost. The 50 per cent sodium fluosilicate dust proved to be definitely more effective than undiluted cryolite against first generation borers and borers in summer plant cane. Cryolite excelled the sodium fluosilicate in handgun tests for second generation control, but the two were equally effective in one plane test.

Different brands of sodium fluosilicate varied in effectiveness. Micro-nized or finely ground sodium fluosilicates were not nearly as effective as the more granular, large particle size dusts.

The build-up of the yellow sugar cane aphid following sodium fluosilicate applications was as heavy as or heavier than that following cryolite, although the general aphid infestation was considerably lighter than in 1944. Sodium fluosilicate injury to cane leaves was negligible in all first generation dusting, but appeared to be of some significance following second generation applications.



## **Cryolite Remains the Recommended Insecticide for Cane Dusting in 1946**

Although the results obtained with sodium fluosilicate have been quite favorable, cryolite dusting is again recommended for borer control during the 1946 season. Further data are necessary before sodium fluosilicate can be recommended on an equal basis with cryolite.

—*A. L. Dugas, C. E. Smith and E. J. Conciencie.*

## **Turnip Aphid is Controlled with Nicotine and Nicotine-Rotenone Dust Mixtures**

The results of tests conducted during the winter and spring months showed that the turnip aphid, an important and destructive pest of turnips, mustard, radish and related crops, is effectively controlled with dust mixtures of nicotine, and nicotine-rotenone. A DDT-nicotine dust mixture, while quite effective, gave a less aphid population reduction than either of the above two dust mixtures. However, the DDT-nicotine was superior in controlling the leaf-eating species, vegetable weevil, flea-beetles, caterpillars, etc., than any of the other dusts or dust combinations under test. The form of nicotine used was a non-volatile soluble dry concentrate powder.—*T. C. Barber and T. P. Dutsch.*

## **Onion Thrips Control**

A series of experiments was conducted during 1945 in the continuation of attempts to discover an effective control for this destructive pest. Insecticides tested included nicotine alone in a non-volatile form (dry concentrate) and in combination with rotenone, with DDT, and with tartar emetic; and a sweetened solution of tartar emetic. The greatest reduction in the thrips population was effected by the DDT-nicotine combination. However, on harvesting the onions from the treated and untreated plots, little increase in yield resulted from the various treatments. The plots treated with nicotine-lime and with DDT-nicotine combinations gave the highest yields, but the increase was of only slight significance. Further experimentation is required on this problem.

—*C. E. Smith and T. P. Dutsch.*

## **Control of the Tomato Fruitworm and the Early Blight Disease**

Experiments in cooperation with the Plant Pathology Department were continued in 1945 to find a safer and better control for the tomato fruitworm and early blight disease of tomatoes than the commonly used lead arsenate-Bordeaux mixture. While this mixture gives fair fruitworm control, it is somewhat objectionable because of the double-residue

hazard, both the lead and the arsenic being poisonous to human beings; and also the Bordeaux tends to retard the development and maturity of the tomatoes. Experiments during 1944 indicated that DDT-copper and cryolite-copper mixtures gave very satisfactory fruitworm control. However, evidence was obtained that the copper used in the different mixtures gave only moderate control of the early blight. A number of tests were repeated in 1945 using both copper and Dithane D-14 as fungicidal agents, in an effort to improve the disease control factor of the complex.

To cover seasonal variations, experiments were included on both spring and fall tomato crops, and the majority of the insecticide-fungicide combinations used were tested under both conditions. The experiments embraced a wide variety of insecticide combinations, including: cryolite alone, and also in combination with copper, with Dithane D-14, and with fused bentonite and sulphur, and as a bait with corn meal; DDT alone, and also in combination with copper and with Dithane D-14; calcium arsenate in combination with copper and with Dithane D-14; and Bordeaux-lead arsenate mixture.

The results obtained in the experiment with spring tomatoes were very inconclusive, mainly because of an extremely light insect infestation. The fall experiment, with a heavier insect infestation, gave more conclusive results. The DDT-copper combination gave the best yields and also the largest sized tomatoes, with the calcium-arsenate-copper combination not far behind. No outstanding results were secured, however, and the Dithane D-14 gave even less indication of controlling the early blight disease than did the copper.

—*T. P. Dutsch, T. C. Barber, L. H. Person and F. J. LeBeau.*

## **Results of Tests with DDT Against Several Miscellaneous Insects**

In addition to the projected experiments during 1945, DDT was used in tests against several miscellaneous insects when infestations of sufficient numbers came to attention. Brief results of the more important tests follow.

### **American Cockroach**

Two applications of a 10 per cent DDT dust practically eradicated a heavy infestation of this cockroach in an unoccupied poultry brooder house. The first application was made July 31, and the second on September 6; 4 days following the first application about two bushels of dead roaches were swept from the floor. The number killed by the second application was equally great, but consisted mostly of newly hatched nymphs. The building was practically free of living roaches by Sep-

tember 20 and remained so for two months, when the observations were discontinued.

Between the first and second applications, a total of 21 dead or dying mice were removed from the building, and four more on the day following the second application. Also a considerable number of earwigs, spiders and grain and carrion beetles were dead or dying scattered over the floor following the application.

### **German Cockroach**

A cattle feeding barn, which was heavily infested with cockroaches, mostly of the German species, was dusted with a 10 per cent DDT dust on September 20. Observations showed that large numbers of dead and dying roaches were on the floor 22 hours after the applications, and others died over a period of 38 days. Also many earwigs, silverfish, spiders and carrion beetles were killed by the treatment.

In a cage test, in which the German Cockroach was the test insect, a 10 per cent DDT dust killed 100 percent of the insects within three days, and a 5 per cent dust killed 98 per cent within six days.

### **Fleas**

Two infestations, a yard and garage, and a garage, were treated with 10 per cent DDT dusts. In both instances, the fleas had been biting children who played on the premises. No live fleas could be found on either place one day after the application. The premises were still free of the insects 20 days after the dustings.

### **Brown Dog Tick**

Three infestations of the brown dog tick were treated with 10 per cent DDT dust. The results in all three were negative or practically so.

### **Flies**

DDT in water suspensions, emulsions and oil solutions were tested against the several species of flies which infest cattle, dairy barns, dwelling houses, and like places. All forms were very effective, especially against the housefly, the hornfly, and the stable fly. These treatments on dairy cattle did not prevent horseflies and deer flies from feeding on the animals, but whether they obtained a lethal contact while feeding was not determined.—*T. P. Dutsch and C. E. Smith.*

# *Fertilizer and Feedstuffs Laboratory*



## **Activities of the Laboratory**

During the past year the major portion of the work done in the Laboratory involved the analysis of samples of feedstuffs, fertilizers and insecticides sold in the state. These samples were collected and sent to the Laboratory by the State Department of Agriculture. All analyses were reported to the State Department of Agriculture and mailed out from that department.

Under the laws regulating the sale of commercial feeds the manufacturer must guarantee the minimum percentages of protein and of fat and the maximum percentage of fiber. The Laboratory made the following determinations on samples of feedstuffs: water; mineral matter or ash; crude protein; fiber; fat and nitrogen-free-extract. More than 1,000 samples consisting of pure ingredients and mixed feeds of all types were analyzed. Wheat bran, wheat gray shorts, corn meal, corn chops, hominy feed, alfalfa stem meal, alfalfa leaf meal, rice bran, rice by-product, rice polish, dried brewers grains, whole pressed cottonseed, cottonseed meal, soybean meal and meat meal were analyzed. Mixed feeds analyzed included various types of dairy feeds, chicken mash, hog rations, horse and mule feeds, etc.

All fertilizers sold in the state must bear tags guaranteeing the percentages of nitrogen, phosphoric acid and potash. Nitrogen, total phosphoric acid, insoluble phosphoric acid, available phosphoric acid and potash determinations were made on more than 1,000 samples of fertilizers. The various types analyzed included nitrate of soda, cyanimid, ammonium nitrate, muriate of potash, superphosphate, colloidal phosphate, basic slag and different grades of mixed fertilizers.

All types of insecticides were analyzed, particular attention being given to calcium arsenate, Paris green, and lead arsenate.

More than 700 miscellaneous samples were sent or brought to the Laboratory for analysis by individuals and business concerns. Farmers often send in samples of fertilizers from which the manufacturer's tag has been accidentally removed. They also send in samples of feedstuffs or plant parts which may have potential feeding value. Miscellaneous feeds analyzed included Spanish moss, whole dehydrated sugar cane, clover hay, native hay, chick peas and alligator weed.



The Laboratory cooperated with the various departments of the University and of the Experiment Station by analyzing different materials used in research work. Last year these materials included sweet potatoes, hays, meat meals, shrimp meal, mixed feeds and a variety of fertilizers. Feed and mineral analyses were run on a number of range forage samples for the Southern Forest Experiment Station in New Orleans. Liming materials were analyzed for the Agricultural Adjustment Administration. Cooperative work involves from one or two samples in some cases to hundreds of samples in others.—*A. P. Kerr.*



# Home Economics

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## Nutrition Education Research—1944-1945

The project in Nutrition Education Research is well into the second year and studies are being made which are based on last year's exploratory work.<sup>1</sup> While this project is one which will require several years' work before any significant results can be realized it may be appropriate to report some of the developments and preliminary findings which give direction to the several aspects of the work presently in progress.

### Preliminary Statement of First Year's Work

#### Food habits

A survey of food habits of 1,726 white children in public schools of Ascension Parish, Louisiana, shows that only 1.5 per cent of them have food habits which rate as good, 57 per cent of them have food habits which rate as fair, and 41.5 per cent of them have food habits which rate as poor.

According to Table 1, the most outstanding needs for improving the food habits of these children are:

1. Double the consumption of milk, eggs, non-citrus fruits and potatoes.
2. Triple the intake of citrus fruits or other sources of ascorbic acid.

TABLE 1. PERCENTAGE OF VARIOUS FOODS CONSUMED BY SCHOOL CHILDREN AS COMPARED WITH RECOMMENDED DIETARY STANDARDS, ASCENSION PARISH, LOUISIANA, DECEMBER 1944  
(White children only)

	Per cent
Milk.....	46
Eggs.....	50
Fruit (non-citrus).....	57
Fruit (citrus).....	35
Meat (lean only).....	109
Whole Grains.....	29
Butter (also Margarine).....	23
Potatoes (Irish and sweet).....	57
Green Leafy Vegetables.....	19
Other Vegetables.....	110
(62 percent of Other Vegetables are peas and beans)	

<sup>1</sup> See Annual Report, Agricultural Experiment Station, Louisiana State University 1943-1944.

3. Increase the intake of whole grain cereals, butter or margarine and green leafy vegetables by four or five times.

While the foregoing interpretation is incomplete, the following conclusions seem valid:

1. Food habits in Ascension Parish are not consistent with those needed to produce well-fed individuals.
2. The survey of food habits yielded specific "needs" upon which to base a sound nutrition education program.

### **Dental conditions**

A dental appraisal was made by the teachers, the nutritionist, and the public health nurse. It is recognized that this group is trained to make only a "screening" inspection; however, there should be little doubt as to the existence of obvious caries in a child's mouth. Under the conditions of this appraisal it was found that of the 2,240 white children studied in the public schools of Ascension Parish, Louisiana, 4 per cent had apparently sound teeth while 96 per cent had apparently carious teeth. Furthermore 22 per cent of the children have teeth *decayed but filled*, whereas 78 per cent of the children have *carious teeth which are not filled*.

On the basis of the above mentioned findings and others perhaps as significant, a program of nutrition-health education has been developed which provides three specific opportunities for experimental work this year. Such work is directed toward the initial purpose of the project: discovering ways to teach nutrition effectively.

### **Preliminary Statement of Second Year's Work**

#### **The development of school-community action on problems of nutrition and health through representative teacher committees**

Representative teacher committees from the five white public schools in Ascension Parish spent two weeks, July 2-13, 1945, in determining plans for programs of education concerned with school-community problems of nutrition and health as evidenced by last year's surveys. The committee's work is continuous throughout the school year and records are being kept under three general headings, namely: (1) Objectives, (2) Activities and (3) Evidences of Success. Several follow-up meetings have been held in the separate schools for the purpose of evaluating the committee's work. One meeting of the five committees was held March 14, 1946, for the purpose of determining the effectiveness of *representative-committee ways* of teaching nutrition. Records of such meetings will be used as sources of data upon which to draw conclusions pertinent to this phase of the experimental work designed to continue for several years.

## **Ways of teaching nutrition in high schools**

A study of the effectiveness of teaching nutrition to high school girls is under way in four white public schools in Ascension Parish. In general the study is designed with emphasis upon a selected pre-testing, teaching, re-testing procedure concerned with nutritional status, nutritional education and nutritional opportunity. The several groups co-operating in appraising nutritional status, and the specific indices for which they are responsible, are as follows: (1) Appraisals of food habits, dental conditions, height-weight-age relationships and general appearance were made by the Home Economics Department, Agricultural Experiment Station, Louisiana State University, and the four teachers responsible for the experimental classes in the Ascension Parish public schools. (2) Physical examinations were made, with particular attention to any defects which might rest on the basis of nutritional deficiencies, by the Nutritional Research Division of the Department of Internal Medicine of Tulane University Medical School. (3) Blood samples were taken by the Ascension Parish Public Health Unit. The samples were studied by the Department of Agricultural Chemistry and Biochemistry, Agricultural Experiment Station, Louisiana State University. Laboratory analyses made by the department included ascorbic acid determinations by the Mindlin and Butler macro method, and plasma protein and hemoglobin by specific gravity according to the method of Phillips, Van Slyke, *et al.* (4) Appraisals of general motor ability, made by the Department of Health and Physical Education, Louisiana State University, included tests of general body coordination, arm and shoulder strength, abdominal strength, agility and endurance.

The assumptions on which the study is based are: (1) When nutrition is taught effectively the results will be not only increased knowledge of nutrition but also improved practices of nutrition. (2) Improved practices of nutrition will be manifest in improved nutritional status. (3) Both nutritional knowledge and nutritional status are measurable, not by a single index but by many indices.

Data are being collected on this study.

### **Determining the effectiveness of personal interpretation and suggested uses of selected nutrition education materials for elementary teachers**

It is assumed that nutrition education materials are of more value when personally interpreted by a nutritionist than they are without such interpretation. It is also assumed that nutrition education materials are of value when their use results in the increased knowledge and improved practices of the user.

Selected nutrition education materials were sent to all elementary teachers in Ascension Parish. Personal interpretations of those mate-



rials are being made to one of five groups of elementary teachers. All elementary teachers were given pencil and paper tests of nutrition information and practices at the beginning of the study. Such tests will be made again at the end of the school term. The group to which personal interpretations are made is the experimental group and *one* of the remaining four groups will serve as the control. This study is being made in cooperation with the Parish Supervisor of Instruction and the Supervisor of Materials, Ascension Parish, Louisiana.

—*Floy Eugenia Whitehead.*



# *Horticultural Research*

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## *Introduction*

Realizing that the maximum service of individuals or institutions can be accomplished only through close cooperation, this department works closely with other departments. The sweet potato project during the war years can be cited as an example of the cooperative efforts of a large number of individuals and departments, such as Nutrition, Home Economics, Dairy Research, Agricultural Economics, Agricultural Engineering, and also ten state experiment stations, the U. S. Department of Agriculture, and the Research Development Division of the U. S. Army Quartermaster Corps. All of these have contributed to solving the problems necessary to supply information for greater food production and utilization for the Army as well as civilians.

## **Sweet Potato Breeding**

The season of 1944 proved to be the most fruitful one in the history of sweet potato breeding at this station, and more than 6,000 seedlings were grown. Particular emphasis has been given to breeding and studying of parental material which possesses superior characters such as higher carotene, higher starch, higher vitamins, and disease resistance. Making use of these better breeding stocks accounts largely for the success obtained this past season with the sweet potato breeding program. With more help available it was possible to analyze the progenies not only for disease resistance but also for starch, sugar, carotene, and proteins. Of the 89 previous-year starch and feed selections, 20 tested as low as 60 to 61 per cent moisture and 9 tested between 58 and 60 per cent, or a total solids of 40 to 42 per cent. Of the 1945 selections, 128 showed higher carotene color than the standard variety, Unit I Porto Rico. Forty-eight of these had the same skin color as the Unit I. An analysis of one of the best seedlings showed four times the carotene value of the standard variety. Of the previous year's selections, it will be noted in Table 1 that the three highest carotene seedlings were L 64, analyzing 588.64 micrograms per gram, L 132, analyzing 565.13 micrograms, and 28x6-42-1, analyzing 526.8 micrograms. All three of these show twice as much carotene as the Unit I Porto Rico. As for sugars, seedling 28x6-42-1 shows 37.69 per cent on a dry weight basis while seedling L 132 shows 34.46 per cent and our standard Unit I shows 23.97 per cent. The analysis for proteins showed that L 9 was the highest, analyzing 6.65 per cent on a dry weight basis while the Unit I showed 4.56. Dr. T. T. Ayers, Associate Pathologist of the Bureau of Plant In-

TABLE 1. ANALYSIS OF SELECTED VARIETIES AND SEEDLINGS SHOWING DRY WEIGHT, CAROTENE, TOTAL SUGARS ON DRY WEIGHT AND FRESH BASIS, AND PROTEINS AFTER THREE MONTHS STORAGE

Name	Dry Wt. %	Carotene, Dry Wt. Basis, Mgms./gm	Total Sugars as invert, Dry Wt. Basis, %	Total Sugars as invert, Fresh Wt. Basis, %	Protein, Dry Wt. Basis, %
Unit I.....	30.24	179.66	23.97	7.25	4.56
Queen Mary.....	26.69	332.22	26.02	6.95	3.75
Ranger.....	29.76	342.71	25.91	7.71	4.63
Pelican Processor (L 4-5).....	37.34	8.03	11.76	4.39	2.68
L 9.....	26.30	348.56	30.24	7.96	6.65
L 64.....	28.88	588.64	27.15	7.84	4.54
L 132.....	33.32	565.13	34.46	11.48	3.93
L 156.....	27.59	321.38	26.15	7.22	3.41
8 (2-1) x 71-42-1.....	37.60	10.1	13.89	5.22	3.67
28 x 6-42-1.....	31.13	526.82	37.69	11.73	4.21
98 x 43-1.....	30.19	210.89	26.47	7.99	3.94

dustry cooperating with this project, has found a considerable number of the older selections as well as the current selections to be resistant to wilt and soil rot. The Pelican Processor and 28x6-42-1 are the industrial potatoes which show resistance to wilt, while L 37 is the only table stock which shows promise of being wilt resistant.

As in previous war years, members of the staff worked closely with the Army on the dehydrated food program and over ten million pounds of dehydrated sweet potatoes were processed for the Army and relief agencies. Working through the certified seed agencies, this station continued to supply improved seed stock to not only our own state growers but also to the other states in carload movements. Also, working with the manufacturers of dehydration plants, five new feed dehydrators were erected and more than twice this number have been contracted for future delivery. At the present time there are ten canning factories and three more are in the process of being erected. The processing plants in the war years demonstrated clearly that by using the No. 2's for food processing and the culls for feed, a better price can be obtained for the No. 1's on the fresh market. Since 1940 this state has more than doubled its carlot movement of potatoes. As of May 1, 8,622 cars were shipped, and it is estimated that rail shipments alone will reach 10,000 for the season. Even to date this is a record movement for car shipments from this state or any other state.—*Julian C. Miller and Victor L. Guzman.*

## Sweet Potatoes for Industrial Use

At the present time there is considerable interest in the production of sweet potatoes for livestock feed. A number of small and a few larger dehydration plants have been established in Louisiana and over the South in general. Some of these are using cull sweet potatoes in estab-

lished commercial shipping areas while others expect to use potatoes grown for the purpose of dehydrating for feed. In the latter cases high production of dry matter per acre produced economically is essential. Information concerning the production of sweet potatoes for industrial use is important.

For the last three years three kinds of sweet potatoes have been planted at two different dates and dug at three different times. A three-year summary of the results are given in Table 2.

The data presented show again that high yields of sweet potatoes can be produced for industrial purposes. The Triumph variety has been the standard for industrial purposes. Both the Pelican Processor and B-196 consistently outyielded the Triumph variety in bushels of sweet potatoes per acre and in dry matter produced. The Pelican Processor contained the greatest percentage of dry matter; the B-196 produced more dry matter per acre. The B-196 is very promising as a potato for industrial use. It tended to produce a high percentage of jumbo roots and it is likely that seed potatoes for this kind should be produced from vines set in June.—*W. D. Kimbrough.*

TABLE 2. YIELDS, MOISTURE CONTENT, AND CALCULATED DRY MATTER PER ACRE OF THREE VARIETIES OF SWEET POTATOES  
*Three Year Average 1944-45*

<i>Name</i>	<i>Date of planting</i>	<i>Date of digging</i>	<i>Yield of marketable potatoes, bu. per acre</i>	<i>Moisture, per cent</i>	<i>Dry matter, pounds per acre</i>
Pelican Processor.....	<i>April</i>	<i>Sept.</i>	338.5	60.97	7,922.9
B-196.....	"	"	438.2	64.10	9,438.8
Triumph.....	"	"	316.6	65.72	6,511.8
Pelican Processor.....	<i>May</i>	<i>Sept.</i>	230.2	61.02	5,273.4
B-196.....	"	"	340.4	64.13	7,326.1
Triumph.....	"	"	245.6	65.49	5,085.4
Pelican Processor.....	<i>April</i>	<i>Oct.</i>	443.6	62.29	10,036.9
B-196.....	"	"	600.0	65.71	12,344.4
Triumph.....	"	"	405.9	66.25	8,219.5
Pelican Processor.....	<i>May</i>	<i>Oct.</i>	349.5	62.73	7,815.5
B-196.....	"	"	451.7	65.39	9,380.0
Triumph.....	"	"	293.3	66.52	5,891.5
Pelican Processor.....	<i>April</i>	<i>Nov.</i>	517.6	64.23	11,108.7
B-196.....	"	"	710.4	67.77	13,737.7
Triumph.....	"	"	455.1	66.10	9,256.7
Pelican Processor.....	<i>May</i>	<i>Nov.</i>	392.8	64.75	8,307.7
B-196.....	"	"	597.8	67.29	11,732.4
Triumph.....	"	"	343.7	67.46	6,710.4



## Seasonal Change in Carotene Content of Sweet Potatoes of the Porto Rico Variety

Sweet potatoes are harvested in the lower South from July well into November. Potatoes dug during the summer are sold without being stored. The carotene content of sweet potatoes is important from the nutrition standpoint. During the 1945 season carotene was determined in samples of sweet potatoes that were dug at intervals during the growing season from vines set to the field at four different times from April 27 to July 6. The data obtained show that the date of planting had little effect on the carotene content of potatoes, except that it was lower in potatoes set to the field at the last date used. After the potatoes attained marketable size, if from plants set out before June 15, they contained as much carotene if dug early as did those from vines set at the same date that were dug late in the season. This indicates that potatoes of the Porto Rico variety that were dug and shipped early in the season should have been as good as those that were shipped later.

—*W. D. Kimbrough, E. A. Fieger, and Harvie Lewis.*

## Waxing Stored Sweet Potatoes

Investigations were conducted to determine the effect of waxing of uncured and cured sweet potatoes on shrinkage and any change in moisture, starch, and sugar contents. There was less shrinkage in waxed potatoes than in unwaxed ones during a two-week curing period but after that there was little, if any, difference. During a storage period of four months there was no appreciable change in moisture, sugar, or starch content of the roots that could be attributed to the wax treatment. Waxing had no harmful effect on the quality of the sweet potatoes. The main benefit derived from waxing was the improved appearance of the sweet potatoes.—*M. H. Blow and W. D. Kimbrough.*

## Breeding of Irish Potatoes

In addition to breeding for regional adaptability and market type, particular emphasis has been given to breeding varieties resistant to certain diseases. Two of the most descriptive diseases in connection with this breeding project have been spindle tuber and leaf roll. Since 1937 the station has been testing seedlings for resistance to spindle tuber. To date there are four seedlings which have not shown any sign of developing spindle tuber and have been grown now nine years adjacent to stocks which were known to carry this disease. These seedlings have been sent to Dr. Schultz, Pathologist of the U. S. Department of Agriculture, for further study. If any of these prove to be resistant it will be the first time in the history of potato breeding that any seedling has been found resistant to this disease. With leaf roll there are two problems to be considered. One is a genetic type of leaf roll which is found in

the Katahdin. This type of roll is found in a certain number of the progenies where Katahdin has been used as a parent. The second type of leaf roll is the true virus type. The characteristics of the genetic and virus leaf roll are similar. It has been decided by Dr. E. L. LeClerc, Pathologist of the U. S. Department of Agriculture, and the writer to discard any seedling which shows leaf roll, regardless of its origin. The two varieties, LaSalle and DeSoto, released by the station appear to be more suitable for fall production than potatoes of any other variety, and also produce very satisfactory crops from home-grown seed. The LaSalle has proved resistant to mosaic and the DeSoto more resistant to this disease than the Triumph. Both of these seedlings are higher in starch and total food value than the Triumph. The Triumph had 16.5 per cent total solids, DeSoto 18.9 per cent, and LaSalle 20.4 per cent in the 1945 fall crop.—*Julian C. Miller.*

## Strawberry Breeding

The 50 best of 5,000 seedlings along with previous-year selections were tested for disease resistance, table quality, quick freezing, ascorbic acid, dry weight, soluble solids, flavor, aroma, and edible quality of the fruit. From the performance records for the past three years it was decided to name one of the new seedlings. This selection is a self seedling of the Fairmore, and the new variety was named Marion Bell. This variety was named after one of the graduate students who helped with the strawberry breeding project and was killed in World War II. The Marion Bell variety is very early in fruit production and the fruit is similar in shape and size to that of the Klonmore but has a brighter gloss, is firm, and has a good shipping quality. The plant is field resistant to leaf spot and scorch. Of the station introductions, the Konvoy still produces the highest yield, with Klonmore and Marion Bell following closely. The Konvoy and seedling L 27 were the two best for quick freezing. The Konvoy is the best home garden variety of any of the seedlings introduced. However, as a shipping and marketing berry, the Klonmore leads, and its popularity increases each year. Owing to the fact that the Klonmore is resistant to leaf spot and leaf scorch and does not have to be sprayed, like the Klondike, the growers who used the Klonmore saved from \$10 to \$15 an acre on the cost of spraying.

—*Julian C. Miller, W. D. Kimbrough, and W. F. Wilson.*

## Breeding of Pole Beans

At the present time there are but few stringless pole snap beans and what few varieties there are, are not ideally suited for Louisiana conditions. In 1938 a breeding project was begun to breed better varieties of pole snap beans. Crosses were made between the Giant Stringless Greenpod and Kentucky Wonder and later some of the selections from the above crosses were outcrossed to the Savage bean. This was a native bean selected by Mrs. W. E. Savage of Marion, Louisiana. Pure lines





Three strawberry varieties bred and released by the Louisiana Experiment Station. Left to right: Konvoy, leading home garden variety; Marion Bell; and Klonmore, the latter two commercial varieties. It is estimated that approximately 80 per cent of Louisiana's strawberry acreage is now planted to the Klonmore,

are being selected from the Savage. At the present time around 50 superior selections are being grown and tested for yield, quality, and resistance to rust. There are three months during the summer when pole beans can be grown and bunch beans cannot be grown profitably. Also, the demand for fresh and canned pole beans is much greater than that for the bush type. It is hoped that breeding better varieties for the home, market, and canners will enable Louisiana growers to extend their season of bean production and supply a better quality bean to the consumer.—*Julian C. Miller.*

## Breeding Lima Beans

Lima beans are among the most nutritious of all vegetable crops and since large-seeded limas do not grow well in the South, it was decided to begin a breeding program by crossing large-seeded limas, such as the Fordhook, with the most productive type, such as Carolina Pole. In 1940 crosses between the Fordhook and Carolina Pole were made with the object of breeding more prolific larger seeded beans. A large number of progenies were grown and 40 of the best seedlings were saved for further study. All of the plants of the  $F_1$ , or the first generation, cross showed the pole or vining character and intermediate pod and seed size.

The vines showed an extremely high degree of hybrid vigor. Most of the progenies continued to be intermediate in pod and seed size as compared to the parental types. A few segregated for large size, L 19 and L 39; however they are not quite as large as the parent, Fordhook. There appeared to be a close linkage between a large-sized seed and late maturity and small seed and early maturity. In order to further select for regional adaptability, the better large-seeded selections will be backcrossed to varieties of the Fordhook type.—*Julian C. Miller.*

## Gladiolus

A further study of varieties adapted to this area has been made. Only a few of the varieties tested have been found worthy of special recommendation as yet. No red variety has been found to be too reliable. Valeria was tried last year and seemed promising and worth a trial. This variety is somewhat similar to Dr. Bennett except that the plants are more vigorous and the blooms more consistently good in case of Valeria. Another red variety that may produce splendid blooms is Rewi Fallu. This very dark red variety should be grown by those who want something a little different, even though the variety cannot be recommended without reservation.

Because of the comparatively few varieties that seem to be well adapted in this area, a breeding program has been started with gladiolus. It is hoped that some superior varieties may be developed for this section.—*W. D. Kimbrough.*



# Plant Pathology

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## Hot-Water Treatment of Sugar Cane

The five-year test of the hot-water treatment of sugar cane requested by the American Sugarcane League was completed in 1945. Test plots on nine different plantations were planted with seed cane treated with hot water at 52° C. Plantings were made each year in August, September, October and November.

In September, October and November plantings, in the plots planted with hot-water treated seed cane, the stands were better and the yields were considerably higher. With the variety C.P. 29/320, the hot-water treatment was responsible for increased yields of  $3\frac{1}{2}$  to 4 tons per acre. Similar increases were obtained with many of the other varieties. The hot-water treatment is not at present recommended for Co. 290 and C.P. 29/116, nor is it recommended for August plantings.

—P. H. Dunckelman and C. W. Edgerton.

## Control of Nematodes by Soil Treatment

In 1944, preliminary tests indicated that the application of the chemical commonly known as DD to the soil has possibilities as a practical control measure for nematodes of tomatoes. More extensive studies were made on tomatoes, cucumbers and okra. For crops planted in hills, such as tomatoes, cucumbers, squash, egg plants and peppers, 5 cc. of the DD chemical should be applied in each hill. This has been done by punching holes approximately six inches deep, pouring in the material and immediately closing the holes. Transplanting or planting of seed should not be done before 12 to 15 days after treatment, and if the soil remains excessively wet a somewhat longer period is

	Number of plants showing severity of nematode				
	No infection	Trace	Light	Moderate	Severe
<i>Tomatoes</i>					
Treated hills.....	94	14	0	0	0
Non-treated hills.....	0	0	0	19	108
<i>Cucumbers</i>					
Treated hills.....	279	27	15	4	1
Non-treated hills.....	20	33	25	78	145



Nematode Control on Okra with DD  
Left, not treated; right, treated with DD.

necessary. Almost perfect control of nematodes was obtained on tomatoes and cucumbers by following this procedure, as is shown in the table on page 79.



Nematode Control on Okra with DD  
Left, treated with DD; right, not treated.



Excellent control of nematodes was obtained on okra by treating the soil with a 5 cc. dosage at 12-inch intervals on the row bed, 15 days before the seed was planted. Three weeks after emergence the plants in the treated plots were larger and greener than those in the non-treated plots. This difference became more pronounced throughout the growing period. The plants in the non-treated plots became yellow in color, shed the lower leaves prematurely, produced few pods and were dead before the end of the normal season, while those in the treated plots grew vigorously and produced a normal crop of pods. At various intervals throughout the season, plants were removed and examined for presence of nematode galls. The plants from the non-treated soil had an abundance of nematode galls while those from the treated soil remained free from galls.—*L. H. Person and S. J. P. Chilton.*

## Fermate Controls the Mildew and Anthracnose Diseases of Cucumbers

For a number of years good control of cucumber mildew has been obtained by dusting with certain copper containing dusts. These materials have controlled the disease as satisfactorily as Bordeaux mixture, and have caused much less injury to the foliage. Higher yields of marketable fruit have been obtained from dusted fields than from fields sprayed with Bordeaux mixture. The higher cost of materials for dusting, however, has limited the use of dusts in the fall cucumber growing area. Recent studies of mildew control have therefore been directed



Effect of Spray Compounds on Cucumber Foliage  
Left, burning produced by Bordeaux mixture; right; no injury produced by Fermate.

towards finding a spray material equal to Bordeaux mixture in disease control and non-toxic to the cucumber plant or one which will cost less. The proprietary copper fungicides, when used as sprays, have been found to be ineffective in controlling the disease. In 1945, a season of moderately severe mildew, dithane appeared to give good mildew control without seeming to cause any injury. The yields, however, from plants sprayed with dithane were no better than from those sprayed with Bordeaux. Dusts containing 3 per cent cuprocide or 8 per cent tribasic copper sulphate were equal to dusts containing 5 per cent and 12 per cent of the respective materials in mildew control. The 3 per cent cuprocide dust caused less injury than the 5 per cent dust and produced a larger yield of fruit. A dust containing 10 per cent Fermate was also highly effective and caused no injury.

During the past two years, the mildew control program has been complicated by epidemics of anthracnose. None of the copper dusts was sufficiently effective against this disease to be of practical value. Bordeaux mixture and dithane sprays were about equally effective, but under favorable conditions for disease development, such as occurred in 1945, these materials gave only partial control. Fermate on the other hand offered practically complete control throughout the growing and harvest season. Yields in bushels per acre from plots in which anthracnose was severe were 460.9, 290.7, 244.3, 233.5, 232.8, 222.2 and 154.8 for Fermate, 3 per cent cuprocide dust, 5 per cent cuprocide, dithane spray,



Controlling Cucumber Diseases with Fermate  
Left, dusted with copper; center, dusted with Fermate.



Bordeaux spray, 12 per cent tribasic copper sulphate, and 8 per cent tribasic copper sulphate, respectively. The yields from Fermate-dusted plots were almost twice as large as those from plots dusted or sprayed with other materials.—*F. J. LeBeau.*

## Treating East Lily Bulbs Affected with the Black Scale Disease

The black scale disease has continued to be a serious threat to the lily industry in South Louisiana. While the certification program has slowed up the spread of the disease, it nevertheless has become clear that a more positive method of control will be necessary if the disease is to be brought under control. The treatment of diseased bulbs with a number of inorganic metallic fungicides failed to offer much promise in that direction; and so in more recent work, extensive tests have been made with the newer organic fungicides.

One of these materials, an organic mercurial known by the trade name "Puratized," was found to be highly effective in destroying the disease organism in diseased tissue. When diseased bulbs were treated and planted in the greenhouse or in the field, the development of black scale was kept under 10 per cent. The chemical was found to be effective over a wide range of concentrations and with different times of treat-



Treating Easter Lily Bulbs for Black Scale  
Upper, not treated; lower, treated with Puratized.

ment. Which combination of concentration and length of treatment is the best still remains to be determined; but from tests so far made, it appears that treatment of 24 or 48 hours is necessary.

In the fall of 1945, popular demand and the possibility of total failure of the certification program made it advisable, despite the fact that only one year's results were available, to make the treatment available to as many growers as possible, and under as close supervision as was possible.

A concentration of 1-2,000 of the chemical for 48 hours of treatment was chosen for these large-scale treatments. Over 2,000 bushels of bulbs were treated and planted in the months of September, October and November. While the results, from the standpoint of black scale control, will not be available before harvest, it is apparent that the treatment was in no way detrimental to the bulbs.—*F. J. LeBeau.*

## Weed Control Studies

### 2,4-D on Various Weeds

In preliminary tests, the 2,4-D derivatives have been found very efficient in killing many troublesome weeds, such as weeds in the rice fields, cockleburrs, milkweeds in sugar cane fields, Cherokee and Chickasaw rose bushes in pastures, ragweeds and many others.

Special attention has been given to the weeds found growing in rice, because the rice farmers pay around \$2.50 per acre to hand pull only one kind of weed, namely indigo. The rice weeds reduce the yield of rice, and deductions of 10 to 35 cents per barrel are made when weed seeds occur in milled rice. Some of the more important rice weeds are indigo, *Sesbania macrocarpa*; curly or silvery indigo, *Aeschynomene virginica*; Mexican weed, *Caperonia castaneaefolia*; dayflower, bat wing or turtle back, *Commelina* spp; redweed, *Melochia corchorifolia*; toothcups, *Ammania coccinea*; mule-ear, *Heteranthera dubia*; Sagittaria, *Sagittaria* spp.; yellow sedge, *Cyperus iria*; tadpole sedge, *Rynchospora corniculata*; goose weed, *Sphenoclea zeylanica*; several species of *Eleocharis*, *Carex*, *Cyperus* and numerous grasses.

The tests have shown that indigo, redweed, turtle back, mule-ear, yellow sedge and related sedges are easily killed by the 2,4-D compounds. Consistent killing was not obtained on large plants of curly indigo, Mexican weed, goose weed, and Sagittaria. No apparent injury was evident on rice over 18 inches tall, but in greenhouse tests, the seedlings showed some stunting. Additional work is necessary before specific recommendations can be made.

Many lawns are infested with a plant which is rapidly spreading, *Soliva sessilis*. Because of the sharp spurs on the fruits, this plant is locally called "bur grass." The plant is not a grass, however, and so the name "spur weed" would be more appropriate. This plant has been

killed with the ethyl and methyl esters of 2,4-D. These compounds also kill carpet grass and may produce injury on nearby ornamentals. Iron sulphate or green vitrol used at the rate of one pound to one gallon of water per 100 square feet will produce an effective kill of spur weed without some of the disadvantages associated with the 2,4-D compounds. The iron sulphate will turn the lawn black, but the grass will soon grow back.

### **Controlling Alligator Weed with 2,4-D and Its Derivatives**

At the 1944 session of the State Legislature, an appropriation was made to study the alligator weed and to investigate various measures of control. This weed has become a serious pest not only in the lakes and waterways, but has also become established in cultivated fields in South Louisiana. It has become particularly troublesome in sugar cane fields and in fields of truck crops. As it is also advancing into the rice belt, it is feared that the weed may become a serious pest in the rice fields in the future.

Many tests have been made, or are under way, to determine whether the alligator weed can be killed out in fields by spraying with chemicals. Two types of chemicals have been used, the caustic herbicides and the newly discovered hormones, the 2,4-D compounds.

It has been found that the alligator weed could be seriously injured or even killed with certain of the caustic herbicides such as the chlorates, borax and ammate, but the general use of these compounds does not seem practical.

The 2,4-D compounds seem much more promising. These compounds not only kill the tops above ground, but are also translocated down into the roots. These substances proved very effective when sprayed on alligator weeds during the summer months. A large percentage of the plants were killed and regrowth was definitely retarded on the others for a period of two to four months. The results which have been obtained justify large-scale tests during the coming season. This study is being made in cooperation with the Department of Botany, Bacteriology and Plant Pathology of the College of Arts and Sciences, and the Department of Agricultural Engineering of the College of Agriculture.—*C. A. Brown.*<sup>1</sup>

### **Blakemore Yellows of Strawberry**

What appeared to be "Blakemore yellows" of strawberry appeared in several plantings of the Klonmore variety in the spring of 1945. While it is probable that this trouble had appeared previously in this variety, it appeared to have been more widespread in 1945 than previously. No

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<sup>1</sup> A staff member of the Department of Botany, Louisiana State University, collaborating with the Plant Pathology Research Department.



peculiar condition of environment seemed to have been associated with the trouble in the 1945 season. Badly affected plants appeared during the latter part of April. Increasing numbers of yellowed plants appeared thereafter. It was observed that affected plants rapidly died out. Dying was especially rapid with the advent of higher temperatures in June. Plants transplanted in June failed to recover while the majority of healthy plants transplanted at the same time survived. To what extent yellows-affected plants survive through the summer will have an important bearing on the future importance of the disease.—*F. J. LeBeau.*

## **Spraying Controls the Blight of Arborvitae**

In continuing the work on the blight disease of arborvitae, studies have been made on the effects of different fungicides as well as time of application of fungicides on disease control. Tribasic copper sulphate, 4 pounds to 100 gallons of water; dithane, 2 quarts to 100 gallons of water; and Bordeaux 4-4-50 effectively controlled the disease when three applications were made at monthly intervals beginning in the first week of June. Good control was also obtained with two applications of Bordeaux mixture, one in June and one in July, and also with a single application of Bordeaux mixture made in June. Thus it appears that the blight of arborvitae may be controlled by a single, properly timed application of a suitable fungicide.—*F. J. LeBeau.*

## **Rice Disease Investigations**

### **Use of Fertilizer in Root-Rot Infested Rice Fields**

Many root rot or alkali areas occur in rice fields of Southwest Louisiana. In previous tests, it was found that an application of fertilizer materially increased the yields in these areas. In order to claim maximum yields from the fertilizer, however, it was necessary to have the fields drained before applying the fertilizer. Ordinarily to drain these areas, it was necessary to drain whole fields. This suggested that the fertilizer might also be profitably applied to the non-root rot areas. Tests were therefore made in 1944 and 1945 to determine whether the non-root rot areas could be treated at the same time as the root rot areas. The tests were made on 25 farms in 10 parishes. The results were as follows: In 27 tests, 400 pounds of 10-10-0 fertilizer averaged 4.7 barrels per acre increase; in 29 tests, 300 pounds of 13-7-0 averaged 3.7 barrels per acre increase; in 31 tests, 200 pounds of 20-0-0 averaged 3.6 barrels per acre increase; and in 26 tests, 200 pounds of 10-10-0 averaged 2.5 barrels per acre increase. The applications of 400 pounds of 10-10-0 gave the most consistent results, 2 or more barrels increase in 96 per cent of the tests, 3 or more barrels in 89 per cent of the tests, and 4 or more barrels in 63 per cent of the tests. The applications of 300 pounds of 13-7-0 gave increases of 2 or more barrels in 93 per cent of the tests, 3 or more bar-



rels in 70 per cent of the tests, and 4 or more barrels in 35 per cent of the tests. The applications of 200 pounds of 20-0-0 gave 2 or more barrels increase in 87 per cent of the tests, 3 or more barrels in 68 per cent of the tests, and 4 or more barrels in 36 per cent of the tests. The applications of 200 pounds 10-10-0 gave 2 or more barrels in 58 per cent of the tests, 3 or more barrels in 42 per cent of the tests, and 4 or more barrels in 19 per cent of the tests.

A comparison of ammonium sulphate, cyanamid, and sodium nitrate as nitrogen sources in four tests gave increases of 3.4 barrels, 2.2 barrels, and 2.4 barrels, respectively. In six tests where ammonium sulphate, cyanamid, and sodium nitrate plus 100 pounds phosphate were compared, increases per acre were 3.9 barrels, 1.6 barrels, and 2.0 barrels, respectively.—*S. J. P. Chilton and T. C. Ryker.*

### **White Tip and Fertilizer**

An opportunity was found on two farms to test the effect of top-dressing on white tip of rice. In the two tests, 400 pounds of a 10-10-0 fertilizer per acre increased yields 4.6 barrels; 300 pounds of a 13-7-0 increased yields 4.4 barrels; 200 pounds of a 20-0-0, 2 barrels per acre; and 200 pounds of a 10-10-0, 2.2 barrels per acre.

—*S. J. P. Chilton and T. C. Ryker.*

### **Treating Rice Seed with Fungicides**

If it is possible to obtain satisfactory stands of rice by sowing the seeds in flooded fields, then a satisfactory control of such weeds as red rice, indigo, and Mexican weed should be obtained. As this method of planting has given erratic results in the past, it was thought that seed treatment might be of value. In preliminary tests in 1945, seed were treated with Arasan and yellow cuprocid, soaked in water for 24 hours, and then seeded in six inches of water, the water being retained on the land. Three plantings were made in April, with Rexoro and Blue Rose varieties. Satisfactory stands were obtained in both treated and untreated seed in the first planting, but plants from seed treated with yellow cuprocid were slightly better and emerged from the water a day or two earlier. In the second and third plantings, yellow cuprocid-treated seed gave considerably better stands than the untreated seed. In one planting, however, made the middle of May, relatively few plants came up from either treated or untreated seed. Arasan was of little value.

—*S. J. P. Chilton and T. C. Ryker.*

### **A New Race of *Cercospora Oryzae* on Rexoro**

In 1944, a few plants of the rice variety Rexoro, which had been resistant to the *Cercospora* leaf spot fungus since its release, were found infected. In 1945, Rexoro, from Rapides Parish to Acadia Parish, was severely attacked by the disease. Inoculation tests made at the station

showed that a new race of the fungus causing the disease was present in the Louisiana rice area. Of the commercial varieties, Blue Rose, Blue Rose 41, Nira, Caloro, Fortuna, Magnolia, Zenith, and Delrex were resistant to this new race. Besides Rexoro, Blue Bonnet, Texas Patna and Nirex were susceptible. A number of selections and hybrids of the Rexoro type were found to be resistant. These will be increased and tested for possible release.—*S. J. P. Chilton.*

## Sweet Potato Disease Studies

### Soil Rot of Sweet Potatoes Controlled by Applying Sulphur

The soil rot has caused very heavy losses on sweet potatoes in certain sections of the state, especially in the vicinity of Sunset in St. Landry Parish. When conditions are favorable, especially in dry weather, the young roots rot off as fast as they develop. The plants either die or do not make vines.

The organism causing the disease will not attack the plants in an acid soil where the pH is below 5.2. As the pH of the soil in the Sunset area is around 5.7, conditions are favorable for the development of the disease.

It has been found that it is possible to lower the pH of the soil to 5.0 by the addition of sulphur. Soil treatment with 600 to 800 pounds of sulphur per acre has given satisfactory control of the disease. In tests carried on through a period of eight years, it has been found that an original application of 600 to 700 pounds of sulphur will give practical field control for a period of 5 to 6 years and possibly more. In dry years, the sulphur treatment has given increases in yield of from 50 to 160 crates per acre. It has been recommended that after about 5 to 6 years, the fields should receive a second application of about 300 pounds of sulphur.

### Black Rot of Sweet Potatoes

Black rot is becoming increasingly important in the commercial sweet potato growing area, and is seriously threatening the industry. While it is recognized that the disease can be satisfactorily controlled by the use of disease-free seed properly treated with one of the standard recommended seed treatments before bedding, and following a suitable three-year rotation, this disease is still spreading at an alarming rate. The seriousness of the disease has become apparent during the past few years since commercial shippers have changed from the brushing process to the mechanical washing process in preparing the potatoes for shipment to markets. Investigations are in process to find, if possible, a material that can be used as a treatment in the washing process to give satisfactory control of the disease.—*L. H. Person.*

## Vegetable Seed Treatment

In some seasons, especially when planting is made early in the spring, considerable difficulty is experienced in obtaining satisfactory stands of some vegetable crops, unless an excessive amount of seed is planted. Seed treatment tests were carried out on cucumbers and squash, using Arasan and Spergon as seed protectants. The percentages of emergence of seedlings were: Cucumber—control 31.2, Arasan 77.1, and Spergon 73.5; squash—control 40.5, Arasan 82.6, and Spergon 80.0. In addition to increasing the seedling emergence, the seedlings in the treated plots 16 days after planting were definitely larger than those in the control plots.—*L. H. Person and S. J. P. Chilton.*

## Shallot and Onion Disease Studies

### Soil Treatment for Control of Shallot White Rot

White rot of shallot, onion and garlic has been studied for the past three years with special emphasis upon control measures. Early varietal tests in infested soil indicated that none of the locally grown varieties shows appreciable resistance to the disease. For this reason most of the work was concentrated on soil treatment tests.

Early tests showed that the white rot fungus grew well on certain acid culture media, but was definitely limited on alkaline media. Since the soils where white rot has been found are definitely acid, lime was applied in an effort to reduce the acidity. Lime applications as high as 3,000 pounds per acre reduced the severity of the disease on shallots to some extent. In one year's test the treated plots gave a satisfactory crop (about 80 per cent good bunches), while the crop on the untreated plots was about 50 per cent normal.

The application of certain chemicals to the soil around growing shallot plants gave excellent control of white rot in small preliminary tests. Semesan at the rate of 1 ounce to  $1\frac{1}{2}$  gallons of water and mercury bichloride 1-500, were applied around shallot plants 3-5 inches tall so as to wet the soil around the basal portions of the plants. The liquid was applied at the rate of about one gallon to 30 row feet. When the shallots were pulled three months later, all the bunches in the plots treated with Semesan and mercury bichloride were in salable condition, while only 10 to 30 per cent of the bunches from the untreated plots could be sold. These early tests indicate that white rot can be greatly reduced in severity on the most heavily infected soil by the application of Semesan or mercury bichloride around the shallot plants before the disease has begun to attack them. This treatment might be practical on small heavily infected areas.

## **Yellow Dwarf Virus in Shallot**

Several years ago, small numbers of shallots were found infected with yellow dwarf. The disease has been spreading progressively in many fields since that time. At present it is scattered over the entire shallot producing area and is becoming widespread in the sections where seed sets are grown. Certain shallot plots being grown for stock seed were recently found to be heavily infected with yellow dwarf. This seed will make very poor planting material and should not be used. Efforts are being made to develop seed stocks free of the disease. Yellow dwarf is a definite threat to the shallot industry, and may prove a very difficult disease to control.

## **Mildew on Shallots and Onions**

Mildew is ordinarily not a common disease of shallots in Louisiana. During the past several years it has been observed only a few times, and never more than an occasional infected plant was found. But in the spring of 1946, the disease was widespread in the same general areas where it occurred on onions. Some fields were rather severely damaged, the green leaves being killed back and discolored so badly as to make them unsuitable for market. Other small plantings were so severely damaged that they were not pulled. Certain growers were compelled to pull their shallots while they were immature in order to avoid total loss from mildew. The losses from mildew in the shallot producing areas were not large, but the outbreak of the disease this season shows that when conditions are especially favorable the shallot may be severely affected.

Onions in the Bayou Lafourche area have been severely damaged by mildew periodically for many years. In these bad years, the crop may be almost a total loss. The bulbs that do develop are small and are inclined to rot badly in storage. The worst epidemic of mildew in recent years developed in the spring of 1946. It was widespread over the entire Lafourche area on onions for bulbs, and was especially destructive on plants being grown for seed. Unless some control method is developed for this disease, many of the onion growers in the affected areas may have to go out of business. Spray tests for mildew control are being conducted at present.—*E. C. Tims.*



# Poultry Research<sup>1</sup>

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## Physiology of the Avian Thyroid

The effect of various hormonal substances on the market quality of male birds is receiving considerable attention. Somewhat similar experiments were undertaken in this department, but with a different objective in mind. Study is being made of the effect of hypothyroidism on the sexual development and subsequent reproductive capacity of males fed varying amounts of thiouracil. The objective is to determine if future breeding males can be retarded in sexual development, to prevent loss of birds by fighting during the growing period and while the males are being held for sale or for use in the breeding pen. Losses among such valuable males may amount to 10 per cent or more of those kept. On the basis of one year's results it appears that thiouracil may be used to retard sexual development without injuring the reproductive capacity of the males. Substantiation of the results and further study as to the optimum level of feeding thiouracil will be made.

The possible effect of hyperthyroidism, induced by feeding protomone, in prolonging the laying period or delaying the molt, is under study. Studies concerning the influence of relative humidity on thyroid activity of young chicks and the influence of the quality and quantity of light on thyroid activity are also being made. These experiments have not progressed far enough to be conclusive, although interesting results are indicated.—*J. P. Mixner,<sup>2</sup> B. A. Tower and C. W. Upp.*

## Adequate Supply of Green Feed Makes Simple Rations Satisfactory

Increased knowledge of nutrition has led to the development and use of quite complicated mash formulas for laying and breeding flocks. The results obtained with simple rations, plus adequate green feed, do not reflect discredit on more exactly "complete" rations but they are of practical importance for two reasons. First, they show conclusively that satisfactory, although not excellent, results can be obtained with simple diets; and second, that farmers can obtain an average egg production of 135 to 155 eggs per hen using laying mash with only one protein ingredient, *when good green feed is provided*. Such sources of protein as shrimp meal, cottonseed meal, peanut meal and soy bean meal have been

<sup>1</sup> For reports of poultry work at the North Louisiana Experiment Station, see pages 117-118.

<sup>2</sup> A staff member of the Department of Zoology, Louisiana State University, collaborating with the Poultry Research Department.

used singly in the laying mash for three years with results equal to or superior to those indicated above. Similar results were obtained when a 32 per cent protein-vitamin supplement was fed with corn and oats ad libitum as the grain feed. The margin over feed cost differed little for the several rations because the rations which yielded fewer eggs cost less. An exception to this rule was the cottonseed meal pen at Baton Rouge this past year. In this case the net income was less because the hens in this pen laid fewer fall and winter eggs, when eggs were higher in price. In the trial at the North Louisiana station, on the other hand, the annual production in the cottonseed meal pen was equal to that of any of the other pens, although fall-winter production was slightly lower.

Hatchability of the eggs, body weight of the hens and egg weight have been consistently satisfactory. The per cent of the birds that lived through the experimental year was quite high in all pens, ranging from 96 per cent in the complex mash and cottonseed meal pens to 84 per cent in the peanut meal pen. Mortality and culling combined varied from 4 per cent in the cottonseed meal pen to 20 per cent in the 32 per cent supplement pen. These experiments have demonstrated conclusively that when good stock is used the annual egg production of Louisiana hens can be doubled even with simple rations if an adequate green feed program is put into effect. The green feed crops used were rye grass and white Dutch clover for winter-spring grazing and lespedeza, bermuda grass and carpet grass for summer-fall grazing. Poultry pastures save on feed cost, improve the health of the layers and increase egg production.—*B. A. Tower and C. W. Upp.*

## **Farm Egg Coolers and Frequent Marketing Important in Maintaining Egg Quality**

Extensive experiments in which the quality of thousands of eggs was carefully checked individually (several times for each egg) have proved the falsity of the statement that "Louisiana eggs are of low quality and will not keep in storage." The results have just as conclusively shown, however, that Louisiana eggs of finest quality will surely deteriorate if (1) improperly kept or (2) if kept too long. Since many eggs are not cared for properly on Louisiana farms and since eggs deteriorate so rapidly during summer weather, there is a basis for the poor reputation that Louisiana eggs have with market men. It need not be so, however, and is not true of eggs that are held under proper conditions and are moved to market twice a week or more often. Egg quality is maintained better by means of refrigeration than by non-refrigerated coolers, as might be expected. The farm egg coolers in turn maintain quality better than "room temperature" conditions. The importance of length of time held and of conditions under which the eggs are held are well illustrated by the brief table on the following page.

# EFFECT OF HOLDING CONDITIONS AND LENGTH OF TIME HELD ON GRADE OF EGGS

(Figures given as per cent of egg in each grade.)

Grade.....	When gathered		Number Days Eggs were Held																							
			1			2			3			4			5			6			7					
	A	B	A	B	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C				
Refrigerator....	92	7	86	14	75	24	1	77	23	0	69	31	1	68	31	1	69	30	1	60	40	0				
Farm Egg Coolers*....	90	10	74	26	68	32	0	64	36	0	57	42	1	55	44	1	44	53	3	36	59	5				
Room Temperature.	92	8	71	29	61	39	0	51	49	0	42	58	0	31	68	1	17	80	3	8	78	14				

\*The four coolers used were humidor, vertical tile, horizontal tile, and oil drum. The latter two are cave type, the second is an underground cooler and the first named is a burlap-evaporation type cooler.

Eggs held in farm egg coolers were shipped via express to market (from Baton Rouge to Shreveport and to New Orleans), where they were regraded by federal-state graders. They held up well, especially those held four days or less before shipment. Some lots of eggs were placed in cold storage and maintained quality in an entirely satisfactory manner. The mold which developed after cold storage in cooler-held eggs last year was avoided entirely this year (1) by fumigating the coolers with formaldehyde and potassium permanganate and (2) by holding the eggs in wire baskets rather than in cases.

At the suggestion of a Louisiana hatcheryman, hatching eggs were held in coolers (for one to seven days) and were subsequently set and hatched. The hatching results for these eggs held in late April and May were entirely satisfactory for eggs held in the coolers and for those held at room temperature. The weather was mild during the holding period.—C. W. Upp and B. A. Tower.

## Improvement by Breeding

Improvement of the breeding flocks of the state by the best known breeding methods is recognized as an important step toward increasing the productive efficiency of all poultry flocks in Louisiana. The better breeding flocks serve a similar purpose to the production of better seed for the improvement of field crops. The production and distribution of Record of Production chicks through the Poultry Breeding Project has been carried on for the past five years to speed up the distribution of good stock. Numerous private breeders are now contributing to the supply of better bred stock that is available in the state. A few figures concerning the Poultry Breeding Project stock will show the progress that is being made. This past year two hundred and thirty-eight pullets

qualified as R.O.P. hens with an average production of 227.1 eggs. Not only must hens lay 200 or more eggs of standard size but they are required to have the size, type and color characteristic of their particular variety and must be free of disqualifying defects. In addition they must react negatively to the pullorum test each year. The high hen of each of the four varieties used laid: Rhode Island Red, 322 eggs; Barred Plymouth Rock, 314 eggs; New Hampshire, 286 eggs, and White Plymouth Rock, 293 eggs. These records are given not because individual records are all-important; as a matter of fact, high egg records of individual hens are often over-stressed. Much more importance is attached to the average record of a family (e.g., a group of 8 or 10 full sisters) than to an especially high record of one individual. The feasibility of improving the productive qualities and the viability of Leghorns by use of the progeny test or family breeding has been well demonstrated in experiments at this and other experiment stations. The same method is in use in improving the dual purpose breeds in the Poultry Breeding Project. R.O.P., S. C. W. Leghorns and White Wyandottes in addition to the breeds mentioned above are being produced by private breeders in the state. There has been a decided increase in the demand for New Hampshires since 1942. In that year more were produced than were required but at present the demand exceeds the supply.

A second approach to the improvement of breeding stock has been made this past year, viz, by the elimination of inherited defects from otherwise superior stock. Certain defects of comb and beak appeared in some of our R.O.P. stock. Special matings have been made to determine (1) whether these defects were inherited; (2) if inherited, the mode of inheritance; and (3) methods of eliminating the defects.

—B. A. Tower and C. W. Upp.

## Experimental Dry Rendering Unit

In an effort to reduce cooking time, refinements in construction and in air flow have been made in the dry rendering unit constructed last year and referred to in the preceding Louisiana Station Annual Report. Poultry offal has been rendered satisfactorily in this vat. The design and operation of the press for extracting the fat from the rendered tankage is at present receiving attention. Improvement is needed in order to produce a finished protein supplement of relatively low fat content and desirable physical properties. Rendered pressed and dried poultry offal is to be tested with chicks and with hens to establish its value as a poultry feed stuff.—O. E. Goff and C. W. Upp.

## Coccidiosis Control

Chickens reared in colony houses, with outdoor yards, and fed a ration containing sulphur and charcoal produced greater gains than did



cnicks grown under the same conditions but fed a ration which did not contain these two substances, or one containing sulfaguanidine.

The chick mortality in all lots was low, even though growing stock and mature birds have been kept on these yards for several years, when not being used by experimental chicks, in an effort to increase contamination. This method of contamination has been resorted to so that natural infection might be secured and the value of sulphur in coccidiosis prevention be studied under these conditions. The low mortality in all lots, regardless of ration or medicant used, illustrates the fact that a control lot must always be maintained. Infection and mortality will vary markedly from one year to the next. It is often the absence of a disease and not the treatment resorted to that prevents the appearance of that disease.

Chicks reared in lamp-heated brooders, exposed to the direct rays of the sun, and fed a ration containing  $2\frac{1}{2}$  per cent sulphur and  $2\frac{1}{2}$  per cent charcoal, produced greater gains and utilized their feed more efficiently than did chicks fed rations containing  $\frac{1}{2}$  per cent or 1 per cent sulfaguanidine or  $\frac{1}{2}$  per cent or 1 per cent of a urea-sulphur mixture.

—O. E. Goff.



# *Rural Sociology*

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## **Medical Personnel, Facilities and Services in Louisiana**

Preliminary analysis of accumulated data reveals the following:

1. In 1945, after losses to the armed forces, Louisiana had one doctor for each 1,464 people, which was slightly better than the minimum standard set by the Surgeon General of the United States for wartime medical care. However, with the distribution that existed, the nine most urban parishes had a ratio of one doctor for each 926 people, and the other 57 parishes had only one doctor for each 2,739 people. Eight parishes actually had more than 5,000 people for each physician, but half of these were adjacent to urban parishes with much better ratios. In recent years there has been a decided tendency for young men entering the profession to locate in the larger urban centers of the state, so the distribution relative to population is becoming less equitable. Twenty-eight per cent of the babies born in the state during the period 1940-1942 had no physician in attendance. The parish variations were very great, only 8 per cent being without medical attention in La Salle, while in West Feliciana, with its very high proportion of Negroes, 76 per cent were born without a doctor.

2. Forty-four parishes have at least one hospital or clinic containing twelve or more beds. Forty-seven have facilities for appendectomies, and in 50 parishes tonsillectomies are performed. Though ranking twenty-second in the nation in ratio of general hospital beds to population, Louisiana still ranks well above all other Southern states. This relatively high position, however, is due in part to the rather large state-hospital program, and since so many of these beds are concentrated in the city of New Orleans, many areas of the state have no adequate hospital facilities reasonably accessible.

3. Eighty-seven and one-half per cent of the parishes in Louisiana are served by local health units, and there are only two other Southern states (Alabama and South Carolina) in which a greater percentage of counties have this service.

4. As in most predominantly rural states, three basic problems that have been present in Louisiana are (1) lack of medical care facilities and services, (2) lack of appreciation by many people for the need of adequate medical care and (3) the inability of a great many rural people to pay for medical care. During very recent years a new consciousness of the need for hospitalization and medical attention has developed, and large numbers of people have been more able to pay for these serv-

ices. This has placed a very acute strain on the numerically inadequate medical personnel and facilities.—Roy E. Hyde.

## The Educational Status of Louisiana's Farm Population

Louisiana's farm people have received less formal educational training than those of any other state in the nation. White farmers as well as Negro have, on the average, completed less grades in school than have comparable groups in other states, and much higher proportions of them have never attended school at all. Although other residential groups in Louisiana likewise fall below the national average with respect to educational attainment, the unfavorable differential is most pronounced for the farm group.

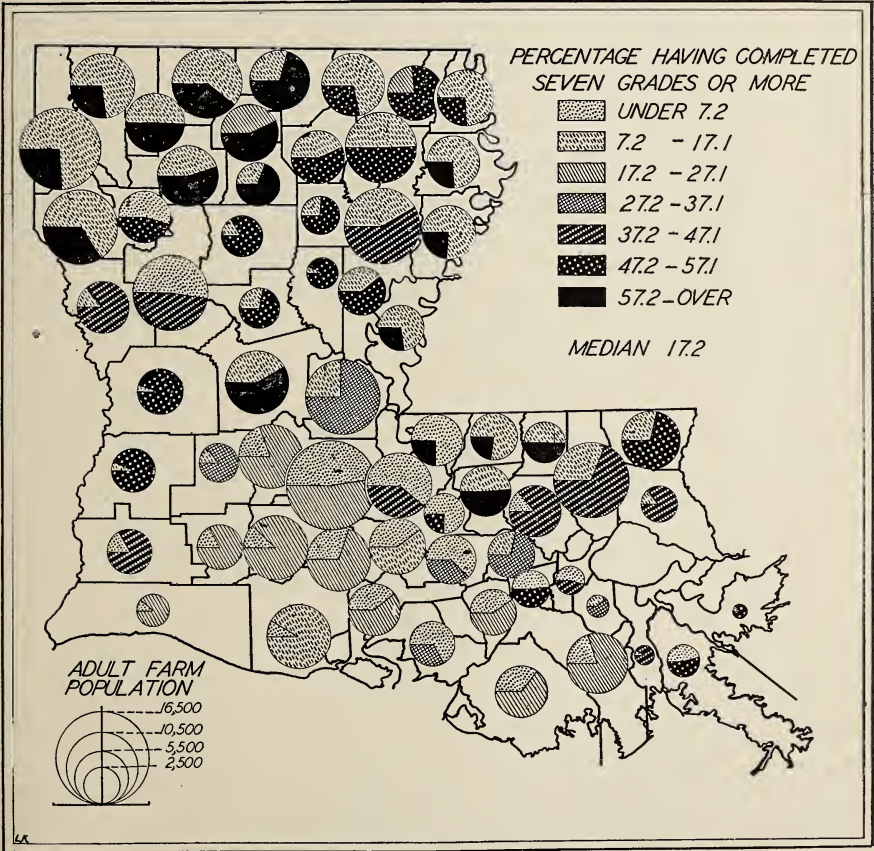


Figure 1. Amount of Formal Schooling Received by the Rural-Farm Population Aged 25 Years and Over, 1940, by Race and Parish. (Beginning at 9:00 o'clock and reading clockwise the segments of the circles represent the Negro and white populations, respectively.)

Within the state, as would be expected, the educational level of whites far exceeds that of Negroes. Persons of both races who live on farms have received less formal education than have city or village and suburban dwellers, and those who reside in the southern part of the state are, in general, equipped with less formal schooling than are those who live in the northern sections. Lincoln Parish leads the state in the educational status of the farm population; and most of its nearest rivals are clustered in the northwestern part of Louisiana. (See Figure 1).

—*Louise Kemp and T. Lynn Smith.*

## Population Composition and Changes

The growth of the farm population in Louisiana is lagging far behind that of the state's towns and cities. Between 1930 and 1940 the rural-farm people increased only 2.8 per cent as compared with 18.7 per cent for the remainder of the population; and since 1940 we estimate that the people living on farms have decreased greatly, probably as much as 20 per cent. The unfavorable differential is true for both whites and Negroes, but is less extreme in Louisiana than in other parts of the nation and the South. Nevertheless, year after year the state's farm population is shrinking in its relative importance.

Within the state, the parishes making the most rapid gains in farm people during the decade ending in 1940 were situated in the sugar area, the Mississippi Delta area, and the rice area; the farm population in other parts of the state either declined or changed little. Furthermore, there is increasing tendency for the farm population to cluster in the areas immediately surrounding the towns and cities.

New urban nuclei are appearing in every part of the state; and those previously in existence continue their rapid growth. Fifty years ago there were only nine urban centers in Louisiana, while in 1940 there were 54. In recent years, New Orleans has not kept pace with the state's smaller urban centers; by 1940 the combined population of the other cities was equal to that of the metropolis. During World War II such cities as Lake Charles, Baton Rouge, and Alexandria mushroomed, largely at the expense of the surrounding farm areas.

Each 100 acres of cropland in Louisiana must support nearly three times as many people as is true in the nation as a whole. Louisiana's ratio of 18.5 farm people for every 100 acres of cropland compares very unfavorably with one of 7.6 in the United States, and 13.6 in eleven other southern states. Only in South Carolina, Kentucky, Virginia, Connecticut, North Carolina, and West Virginia must each acre of land support more farm people than in Louisiana. Within the state the pressure of population upon land resources is least intense in north central Louisiana and in the rice growing parishes of the southwest. It is the greatest in the sections producing strawberries and truck crops, and in some of the cutover areas such as La Salle, Vernon, and Beaure-



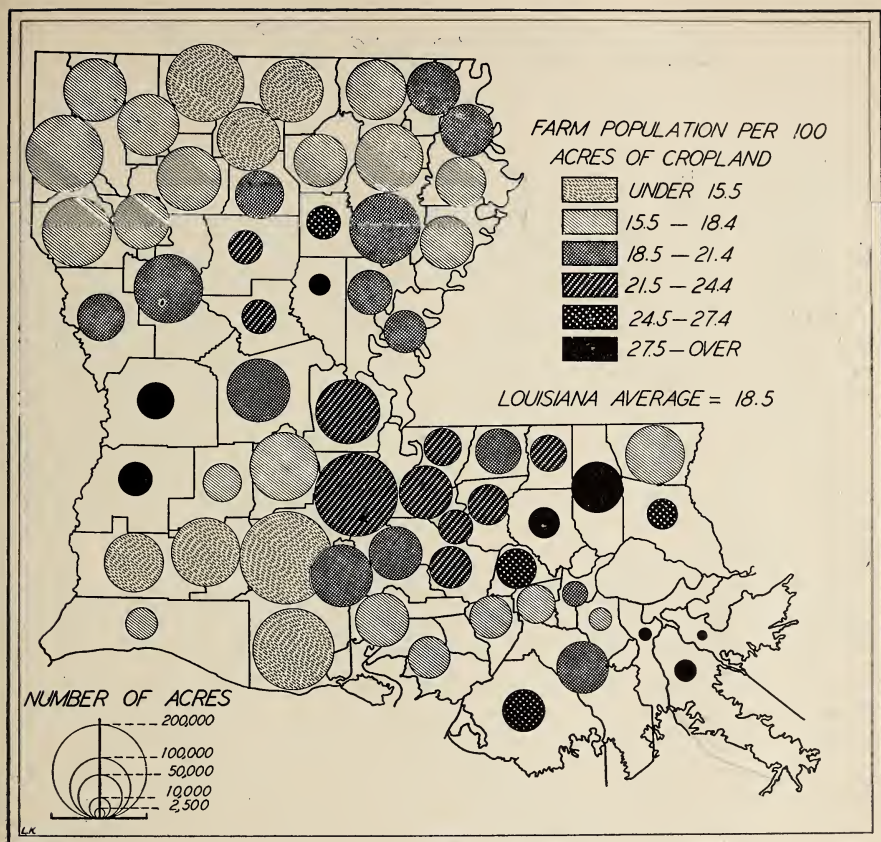


Figure 2. The Density of Farm Population in Louisiana, 1940, by Parishes.

gard parishes. It is also high in the dairy section to the north of Baton Rouge and in parts of the sugar bowl. (See Figure 2.)

If value of land and buildings, instead of acres of cropland, is used as the basis for comparison, Louisiana retains the same disadvantaged position in the nation and in the South; for every \$1,000 value in farm lands and buildings, Louisiana has 2.4 farm people as compared with 0.9 in the nation and 1.6 in eleven other southern states. In the state, the upland cotton area makes a relatively poor showing, whereas the southern parishes comprising the rice, sugar, and trucking areas as well as the parishes of the Mississippi Delta are better off. The parishes which contain urban centers make a better showing than those that are strictly rural.—*T. Lynn Smith and Homer L. Hitt.*

# Seed Increase Work

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## Hybrid Corn

The demand for seed of adapted strains of hybrids is far greater than the supply. In 1945 seed producers in Louisiana planted 824 acres in double-cross production plots. However, owing to backwater and other losses, only 769 acres were harvested. From this acreage in production plots, approximately 8,500 bushels of cleaned seed of Louisiana hybrids were placed on the market in 1946. This amount of seed will plant only 15 to 20 per cent of the total corn acreage in Louisiana for 1946.

The main "bottleneck" in producing hybrid corn seed is the production of single-cross seed. In 1945 there were 50 acres planted to single-crosses. From this acreage enough seed was produced to plant 1,000 acres in double-crossing plots in 1946. This means we are averaging only 120 pounds of seed per acre on the single-crossing plots.

In 1946 there will be 80 acres in single-crossing plots. Even though this is more than a 50 per cent increase over 1946, it will not produce enough foundation single-cross seed for 1947 double-crossing plots.

In 1945 seed was produced for Louisiana white hybrids 468, 518 and 3802. In addition to this, seed was produced for Louisiana hybrid 1031, a white-capped, yellow-grained corn, and Louisiana hybrid 2909, a yellow flint-type hybrid. All of these hybrids will again be produced in 1946, except Louisiana hybrid 3802. The susceptibility of this strain to weevil damage does not warrant continued production, even though it is an extremely high yielding strain.

In addition to the above listed strains, there will be production plots for Louisiana white hybrid 502; Louisiana hybrid 1030 and a new pure yellow dent-type hybrid which has been designated as Louisiana hybrid 731.—*J. B. Holley.*

## Vegetable Crops

The specialist's work (in 1945) was largely devoted to increasing, by Louisiana growers, new varieties of vegetables bred by the Agricultural Experiment Station of the Louisiana State University.

Growers were assisted in producing and selling seed and plants as shown in the table on page 101.

A total of 381,487 pounds of improved seed, 620,000 plants, and 6,300 bushels of potatoes valued at \$73,529 were produced by 42 Louisiana growers and the Louisiana State Penitentiary under the specialist's supervision.

<i>Item</i>	<i>Quantity</i>	<i>Unit Price</i>	<i>Value</i>
Collards (La. Sweet) . . . . .	3,200 lbs.	\$ .30	\$ 960.00
Corn (La. Bayou) . . . . .	3,900 lbs.	.20	780.00
Corn (U.S.D.A. 34) . . . . .	20,100 lbs.	.20	4,020.00
Okra (Green Velvet) . . . . .	50,000 lbs.	.20	10,000.00
Okra (La. Market) . . . . .	200 lbs.	.30	60.00
Cabbage (Allyear) . . . . .	250 lbs.	2.00	500.00
Onion (C-5 Creole) . . . . .	3,600 lbs.	3.00	10,800.00
Shallots (La. Pearl) . . . . .	300,000 lbs.	.07	21,000.00
Watermelon (Dixie Queen) . . . . .	200 lbs.	1.00	200.00
Strawberry plants (Konvoy, Klonmore, and Klondyke) . . . . .	220,000 plants	10.00 per M	2,200.00
Onion Plants (C-5 Creole) . . . . .	400,000 plants	1.50 per M	600.00
Sweet potato (Unit 1) . . . . .	5,800 bu.	3.50	20,300.00
Sweet potato (Queen Mary and other seedlings) . . . . .	500 bu.	4.00	2,000.00
Pepper (Dixie Wonder) . . . . .	12 lbs.	7.00	84.00
Pumpkin (Longfellow) . . . . .	25 lbs	1.00	25.00

Sufficient quantities of Louisiana Spineless Green Velvet okra, C-5 Strain of the Creole onion, and Louisiana Pearl shallots were produced by Louisiana farmers to supply the demand from Louisiana seed dealers and other customers for the first time since their introduction.

—*Joseph Montelaro.*

# *Sugar Cane*

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## **Test Field Work**

During the season of 1945, the outfield sugar cane variety work of the Experiment Station was conducted at the following eight locations in the cane belt of the state: Cinclare, Napoleonville, Reserve, Bunkie, Meeker, Franklin, Broussard and Youngsville. There was a total of twenty-three experimental fields, averaging approximately two acres in size. A total of thirty-eight varieties, consisting of eleven commercial canes and twenty-seven unreleased varieties, was under cultivation during the past season.

The Experiment Station test fields were worked by the cooperators under their regular field system practiced in the commercial production of sugar cane for sugar. There was no special attention given to these fields, which were accorded the same treatment as fields under commercial production. All of the important procedures in connection with the work, such as, planting of varieties, harvesting, weighing and big-mill testing, sampling and small-mill testing of varieties, were all under careful supervision.

Final results of test field work were obtained during the regular Louisiana sugar cane harvesting and milling season. A mimeographed report, "Sugar Cane Test Fields—Season of 1945," which has been prepared, gives complete data and information on sugar cane outfields for 1945.

## **Test Field Plantings**

In the early fall period of 1945, a total of nine fields was planted at the eight Experiment Station test field locations, from September 17 to October 12. This phase of the work included the following plantings:

### *(1) Main plot tests:*

(Cinclare, Glenwood and Reserve) Yazoo soil: C.P. Nos. 29-120, 29-320, 34-120, 36-13, 36-105, 36-183, F. 36-819; C.P. 37-5 (Glenwood); F. 36-671 (Glenwood and Reserve).

(Cinclare) Sharkey soil: C.P. Nos. 29-116, 33-224, 34-21, 34-120, 34-139, 36-13, 36-105, and 36-191 and F. 36-671.

(Caffery) Franklin soil: Co. 290, C.P. Nos. 29-116, 34-120, 36-13, 36-105 and 36-183, F. 36-671 and F. 36-819.

(Billeaud and Youngsville) Lintonia and Olivier soils: Co. 290, C.P. Nos. 29-116, 33-243, 33-310, 34-120, 36-13, 36-105, 36-183 and 36-191, F. 31-762, F. 36-671 and F. 36-819.

(Shirley and Meeker) Yahola soil: C.P. Nos. 29-320, 33-243, 34-120, 36-13, 36-19, 36-105, 36-183, 36-197, 37-5, and F. 36-671 and F. 36-819.



## (2) *Introductory varieties:*

Small lots of seed cane of seven new Canal Point seedlings grown at the L. S. U. Sugar Experiment Station were taken by trucks furnished by our cooperators, and planted at the eight test fields. The following varieties were planted on a small plot basis: C.P. Nos. 43-3, 43-9, 43-28, 43-32, 43-33, 43-47 and 43-49.

## (3) *Increases of the promising C.P. 36-13 variety:*

Our test field cooperators, showing the usual interest in the propagation of new varieties, made the following early fall plantings of the promising C.P. 36-13 seedling cane, consisting of a total of twenty acres: Cinclare, 1.5; Glenwood, 3.5; Reserve, 3.5; Caffery, 3.0; Shirley, 4.0; Meeker, 3.0 and Billeaud, 2.0.

## Season of 1945

At the three Mississippi river alluvial section test fields, C.P. 34-120 showed higher sucrose content and outranked the newly released C.P. 36-105 variety four out of seven times. It also outranked C.P. 36-105 at the Meeker and Shirley test fields and was definitely higher from a sucrose standpoint. In the Teche and western areas, C.P. 34-120 outranked C.P. 36-105 in five out of six tests.

In a total of fifteen tests at the eight test fields, C.P. 36-13 surpassed C.P. 34-120 three times and was higher in sucrose content seven times.

Two unreleased varieties, C.P. 33-224 and C.P. 34-21, made an excellent showing on Sharkey soil at the Cinclare test field.

In the Red river area, C.P. 34-120, C.P. 29-320 and C.P. 33-425 were the three leading varieties.

In the western area, C.P. 33-310 continued to show earlier maturing qualities, and outranked Co. 290 and C.P. 29-116 in the average results of fall plant cane and first stubble.

C.P. 37-5, an unreleased variety, showed good performance at the Reserve test field. C.P. 36-183, another unreleased variety, made a very favorable showing at the Reserve, Shirley, Caffery and Sterling test fields. This cane has proved to be quite subject to lodging and is not adaptable to mechanical harvesters.

Of the new varieties, in the introductory fall plant cane, the results indicate that F. 36-671, F. 36-819 and C.P. Nos. 36-178, 36-197 and 36-203 are showing some promise in comparison with the standard commercial canes. Additional data and information are to be obtained in 1946.

—C. B. Gouaux.

## Varieties

The variety C.P. 36-105 discussed in the last annual report was released for commercial cultivation during the fall of 1945. Sucrose analyses and indicated yields of sugar per ton of cane have compared favorably with those obtained from Co. 281 and C.P. 34-120. Tonnage yields per acre have been high, but have been, on the average, slightly under those

obtained from C.P. 34-120, which is now established as a major field variety. The good yielding and satisfactory sucrose qualities possessed by C.P. 36-105 combined with the high degree of resistance to stubble failure, which is associated with prolonged standing of sugar cane during the latter portion of the grinding season after such sugar cane has been killed by cold weather, is a very important and valuable trait. C.P. 36-105 has proved superior to C.P. 34-120 in this respect and so can supplement C.P. 34-120 during this dangerous period of sugar cane harvesting.

C.P. 36-105 should prove widely adapted as an excellent midseason to late season variety particularly in the lower and middle sections of the sugar district; however, in the northern (Red River) section, sucrose analyses may not be high enough to justify extensive plantings; and in the western area, where Co. 290, C.P. 29-116, and C.P. 33-310 are the main field sugar canes, trial plantings and not extensive plantings are indicated.

C.P. 36-13 continues to show promise of commercial value and we expect that this variety will be released for commercial planting this fall for those soil types and areas of the sugar district where test field results are satisfactory.

C.P. 36-19 and C.P. 36-183 both continue to show commercial promise and are being increased. Neither C.P. 36-19 nor C.P. 36-183 is outstanding enough to justify expectation of becoming a major field variety, but each may find a place in the sugar cane variety program.

In the fall of 1945, seven new varieties were introduced onto the eight Experiment Station Test Fields and on our Primary Increase Station on Smithfield Plantation.—*E. C. Simon and F. W. Berthelot, Jr.*

# *Veterinary Science*

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## **Johne's Disease in Cattle**

Johne's disease is a chronic infectious disease affecting the lining of the intestinal wall of cattle, sheep, goats, and the deer. The gut wall becomes much thickened and is thrown up in rolls giving the appearance of a washboard when it is opened. The disease is most prevalent in intensively cultivated districts, especially where dairy cattle are kept in close association with each other.

This experimental work is being done to try to find a specific and reliable diagnostic agent for this disease, to determine the length of time necessary to wait between tests when retesting a herd, and also to study the damage and destruction done in the animal's body by the germ.

Five naturally infected and one non-infected (control animal) yearling heifers were used for five months on experimental sensitivity tests. Four complete tests were made on the mature cattle in two dairy herds with johnin and mammalian tuberculin. Forty-eight and 72 hours after injections, millimeter increases in skin thickness were recorded on test sites. Two complete tests were made on the calves and yearlings in the same herd. The caudal fold was used continuously and in addition, a different area on the neck was injected at each test. This new (unused) area acted as a control to the normal sensitivity of the animal to the intradermic test. From the results it would seem advisable to wait longer than one month if the same testing site is to be used for the purpose of a retest for this disease.

All animals showing clinical symptoms of Johne's disease are confined to isolated experimental plots in order that the premises, including soil, sheds, water troughs, etc., may be thoroughly contaminated with the germ that causes the disease. These contaminated pasture plots will be used in future experiments to determine the length of time cattle will have to be withheld from them before they are safe to graze again. It seems this is necessary before any recommendations can be made on cleaning up an infected herd of cattle and their surroundings.

All clinical cases appearing in the experimental herds were autopsied in the latter stages of the disease. Microscopic examinations were made of scrapings of the lymph glands and intestinal tract to study the invasive power and distribution in the animal's body of the germ causing the disease. In all instances these animals have shown the typical gross pathology of the disease, and the causative agent has been demonstrated.

—Dennis Sikes.

## Anaplasmosis in Cattle

Experimental findings reveal that the severity with which clinical anaplasmosis will affect individual cattle cannot be predetermined. It may be very mild and occur without knowledge of the owner or may be extremely severe and fatal. Fifty experimentally produced cases resulted in 45 to 50 per cent fatalities, and 50 to 55 per cent recoveries from clinical attacks of the disease. Because of this high percentage recovery and many apparently successful attempts at treatment of all types of cases, various medicinal agents have frequently been suggested as beneficial in treatment. Under experimentation, none which has been adequately tested has proved to have specific action on the causative agent of anaplasmosis. Whenever a practical treatment procedure is found and its merits proved, it will be made available through the veterinary profession.

The amount of infective blood required to produce anaplasmosis in susceptible cattle has been shown to be very small. Minute amounts of such blood injected into the skin of healthy cattle resulted in severe and fatal anaplasmosis. The severity was equal to that caused by much larger amounts of infective blood injected beneath the skin. This emphasizes the role which can be played by such agents as blood-sucking flies as transmitting factors. Anaplasmosis outbreaks in many sections are most prevalent and of greatest economic significance during seasons of highest fly populations. Also indicated is the role which man can play in unknowingly transmitting the disease through careless dehorning, vaccination, castration and other minor surgical procedures. The necessity of using clean, sterilized instruments for each operation cannot be stressed too greatly in areas such as Louisiana where cattle are frequently present in herds as unrecognized carriers of anaplasmosis.

Certain disease producing agents have been found to grow on egg embryos, and this fact has been put to much practical use in recent years. The adaptability of the causative agent of anaplasmosis has been similarly studied during the year. Under this procedure the causative agent could not be grown. Attempts at test tube culturing have also been continued in various ways, but results have not been encouraging in trials to grow this causative agent other than in the blood stream of cattle.—*P. L. Piercy and Eva S. Krug.*

## Gastro-Intestinal Nematode Parasites of Cattle

Calves have been found to be much more severely affected by the nodular worm than by the stomach worm in carefully controlled experiments. Very severe symptoms have been produced and death has occurred in pure infections with the nodular worm, while it has been possible to produce symptoms of parasitosis in but one animal with the stomach worm. It has been found also that symptoms of parasitosis develop



during the larval period of the parasite rather than during the adult stage. Animals may begin to show the effects of the infection in from 5 days to 3 weeks after receiving the nodular worm larvae, while the adult stage is reached after 35 to 40 days. Animals show the effects of the infection by refusing to eat and drink, and in failure to gain weight, in light infection; and by a rapid loss of weight in heavy infections. In most cases there is a very severe diarrhea with a very bad odor and sometimes containing blood and blood clots. Animals begin to show improvement in general condition and to gain weight with the maturing of the larvae, as indicated by the appearance of parasite eggs in the manure, although they stay in poor condition and their weights remain below normal for months afterward.

Within from 1 to 4 months animals develop an immunity to the adult worms, and that they are eliminated is indicated by a rapid decrease in the number of eggs present in the manure and by the relatively few adults recovered at postmortem. Upon reinoculation further symptoms fail to appear and the number of parasites fails to increase, indicating the development of a resistance to the reinfection. This immunity, according to our observations, is permanent and lasts throughout the life of the animal. These observations indicate that the use of treatment for the removal of the adult parasites is of less value as a means of bringing about the recovery of affected calves than is generally believed. Treatment is more beneficial as a means of protecting unaffected and particularly non-immune animals by reducing the egg output of those calves harboring large numbers of adult worms. Owners should also realize the importance of such preventive measures as pasture rotation and clean barns as a means of eliminating the sources of infective larvae. Barn sanitation should not be neglected, since it has been found that infection of some species may occur through the skin and calves may lick the larvae from the hair after lying on contaminated floors and soil under shade trees.—Roy L. Mayhew.

## Crotalaria Spectabilis Poisoning in Louisiana Livestock

Losses from *Crotalaria spectabilis* were investigated in one parish and were found to occur in animal species other than cattle and chickens, which were reported last year. The others include horses, mules, sheep and swine, according to available history and limited autopsy examinations. Information relative to the poisonous quality of *C. spectabilis* has been disseminated through the following media:

*Circular 36*—Livestock Poisoning by *Crotalaria Spectabilis*, October, 1945, P. L. Piercy and L. L. Rusoff, Louisiana Agricultural Experiment Station.

*Paper*—Monocrotaline, the alkaloid of *Crotalaria spectabilis* Roth responsible for death of Louisiana livestock and poultry, presented at

the Baton Rouge Regional meeting of the American Chemical Society, October 26, 1945. Illustrated by kodachrome slides.

*Abstract*—above paper—Proceedings of the Baton Rouge Regional meeting of the American Chemical Society held October 26-27, 1945.

*Paper*—*Crotalaria spectabilis* poisoning in Louisiana Livestock, P. L. Piercy and L. L. Rusoff. Jour. American Veterinary Medical Association, February, 1946. 4 Kodachrome figures.

—P. L. Piercy and L. L. Rusoff.

## Experimental "Pinkeye" Treatment in Cattle

Comparative observations on four experimental treatment procedures applied in efforts to control "Pinkeye" in 194 studies have been made in University cattle. Four agents developed in recent years were tried in these studies—sulfanilamide, sulfathiazole, tyrothricin and penicillin, respectively. Limited laboratory studies were made as time and facilities permitted in correlation with treatment administrations in efforts to associate the occurrence of the condition with a specific causative agent.

Low treatment efficiency, the need for repeated treatment with unpredictable frequency, and the long duration of many cases in spite of treatment are all factors which identify the procedures employed as impractical in "pinkeye" control under range and many farm conditions. In some instances the ineffectiveness of treatment was marked by increasing severity of the condition with the eventual formation of an ulcer. At that stage it became necessary to employ controlled cauterization, after which recovery was relatively rapid and complete. Isolation of a specific causative agent was not accomplished.

—P. L. Piercy, A. H. Groth and Eva S. Krug.

# Substations

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*Fruit and Truck Experiment Station, Hammond*  
W. F. Wilson, Jr., Superintendent

## Strawberry Studies

### Variety Test

As part of the breeding program with strawberries carried on with Dr. J. C. Miller, the seedlings selected by observation of a few plants the first season are increased and planted in regular variety or yield tests with the standard varieties for this area.

For a seven-year period the disease resistant new variety Klonmore has produced an average yield of 193 crates per acre in comparison with an average of 191 crates per acre from the variety Klondike.

The new variety Konvoy produces larger yields than either of the varieties mentioned but lacks the shipping quality necessary for commercial production. This variety is recommended for home gardens and local markets.

The seedling L-39, to be introduced as "Marion Bell," has a very attractive fruit and produced yields this season comparable to those of the standard varieties, with a very high per cent of the total crop produced during the first half of the season.

### Effect of Lime on the Production of Strawberries

Applications of dolomitic limestone at the rates of 1,000, 3,000, and 5,000 pounds per acre were made prior to the 1937 crop, establishing areas with a range in acidity from pH 4.4 on the normal areas to a pH 6.2 on the heavily limed areas. Acidity tests during the 1942 season showed for these areas a range from pH 4.3 on the normal areas to pH 5.0 on the heavily limed areas. Average yields from these areas during the eight-year period 1937 through 1944 showed consistent increases with the application of lime. The heavily limed areas produced an average of 221 crates per acre in comparison with an average yield of 180 crates per acre from the normal areas.

For the 1945 season additional lime was applied to the heavily limed plots and plants produced on unlimed and limed areas were set for comparison on both the normal and limed areas. The yield of berries on limed areas was greater than on the unlimed, or normal, plots. However, there was no difference in yields on limed areas that was due to the conditions under which the plants were originally produced; in other words, plants originally produced on unlimed areas gave just as great yields as plants produced on limed plots, when both were set to limed.



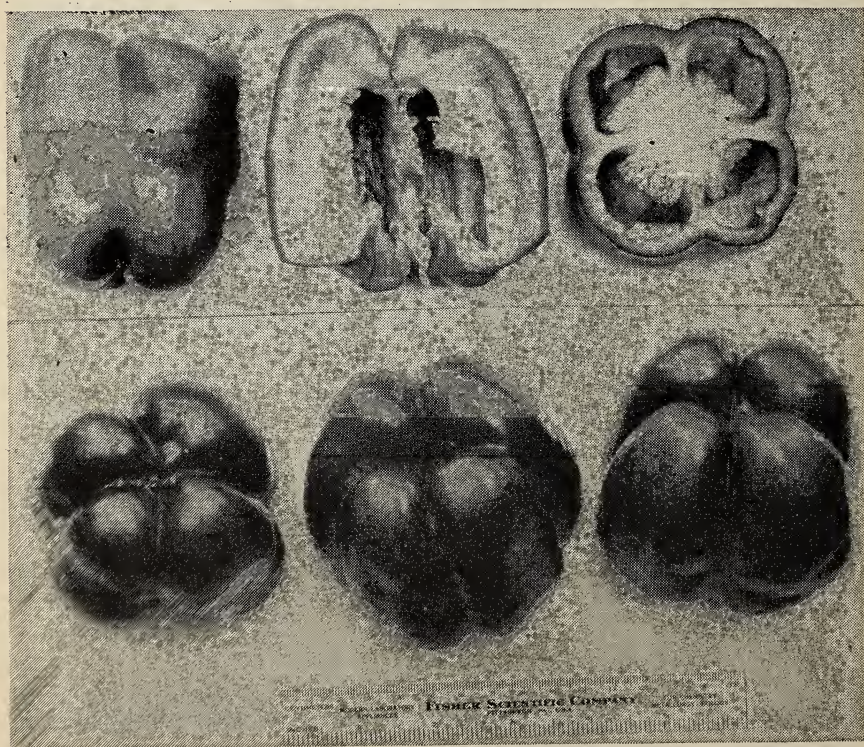
areas for production of berries. In the production of berries on unlimed, or normal, areas, which were extremely acid, plants that had been produced originally on limed areas showed an average of seven crates per acre increase over plants grown originally on unlimed areas.

### Fertilizer Application

Owing to the widespread practice of applying all or a part of the fertilizer for the strawberry crops as a top-dressing at the time of scraping and mulching, a test involving variations of this practice was established this season.

The recommended formula and rate of 1,500 pounds per acre of a 4-12-4 fertilizer was applied under the crop, and a top-dressing, also using varying combinations of the two treatments, was used.

A single season's results show the largest yields from applying all of the fertilizer under the crop prior to setting the plants to the field.



Typical Fruits of the Dixie Wonder Pepper, Showing Thickness of Side Wall and Interior



## Pepper Breeding

Last year's report gave a brief description of a new strain of pepper, Dixie Wonder, developed for South Louisiana. Owing to unfavorable conditions, adequate seed stocks were not produced this year and as the introduction and general planting of the variety is not possible until next season, attention is again called to the more valuable characters and behavior of the variety.

This season California Wonder, the standard variety for this area, produced a total yield of 259 bushels per acre in comparison with a yield of 345 bushels per acre by Dixie Wonder.

The Dixie Wonder was placed with a limited number of growers who tested it under field conditions. The new variety proved very productive and produced peppers of a very desirable market type.



Plant and Fruit of Dixie Wonder Pepper

## Okra Breeding

The new variety Louisiana Market, developed to meet the needs of the commercial market, was grown by a few growers this past season with excellent yields of a high quality pod meeting the requirements of the markets.

Adequate supplies of seed will be available for the coming season.

### *North Louisiana Experiment Station, Calhoun* *Dawson M. Johns, Superintendent*

## Agronomy

### **Corn Varieties and Hybrids**

The commonly grown open-pollinated varieties were grown in a yield test with a large number of Louisiana Hybrids. The average yield of the six highest producing Louisiana Hybrids was 9.1 bushels per acre, or 14.7 per cent, more than that of the six open-pollinated varieties included in the test. The Louisiana Hybrids were as good as the open-pollinated varieties in quality and in resistance to diseases, insects, and lodging. Louisiana Hybrids 468, 3802, 502, 518, 520 and 1030 are highly recommended.

Louisiana Hybrids were compared in a yield test with hybrid strains developed by private and commercial breeders. The Louisiana Hybrids produced higher yields and better quality than any other hybrids included in the test. Tests along this line will be continued.

### **Corn Fertilizers**

The results of experiments and field experience at the North Louisiana Experiment Station show clearly that proper fertilization of corn is essential if the crop is to be grown economically in the hill areas of North Louisiana. Yields ranging between 10 to 20 bushels per acre are produced where no fertilizer or inadequate fertilizer is used. Corn properly fertilized and cultivated produces 30 to 40, and often as much as 60, bushels per acre. The production of corn has been increased 20 to 30 bushels per acre with the use of \$8.00 to \$10.00 worth of fertilizer per acre. Proper fertilization of corn increases yields, improves quality, reduces the number of cultivations required and lowers the per-bushel cost of production.

Cooperative corn fertilizer demonstrations based on the recommendation of 375 pounds per acre of an 8-8-8 fertilizer before planting and a side-dressing with 100 pounds per acre of a 16 per cent nitrogen material were conducted on a large number of farms by the county agents of the Agricultural Extension Service in North Louisiana, and the following summary is reported by R. A. Wasson, Extension Agronomist:

"The purpose of these demonstrations was to show the advantages of using recommended fertilizer materials as to grade and quantity over fertilizer practices commonly used on farms for corn.

Total number of demonstrations.....	108
Average yield all demonstrations.....	48.1 bu. per acre
Average yield all checks.....	32.5 bu. per acre
Average increase all demonstrations.....	15.6 bu. per acre
Per cent increase over checks all demonstrations.....	48

#### "Conclusions:

1. A high grade complete fertilizer under cover, as a starter, gives profitable increases in yields.
2. It not only pays to fertilize corn, but it is much more profitable to use the right grade and quantity.
3. In a normal growing season there is not an important difference in yields on hill, bluff and alluvial soils if sufficient plant food is provided.
4. It requires about two pounds of available nitrogen under average farm conditions for each bushel increase in yield.
5. The state average yield of corn can be materially increased by proper fertilization."

### Corn Spacing

A corn spacing test was conducted to determine the influence of spacing on the production of a high-yielding Louisiana Hybrid. The Louisiana Hybrid 468 was grown in 42-inch rows with single-stalk hills spaced 18, 24 and 30 inches apart. An application of 1,250 pounds per acre of an 8-8-8 fertilizer was made before planting so that ample plant food would be available throughout the growing season. The yields produced by the different spacings were 66.2, 65.1 and 65.8 bushels per acre, respectively. The test will be continued.

### Grain Sorghum

**Variety Test:** A yield test comparing Early Hegari, Martin, Plainman and Caprock was conducted. The planting was made June 19 following an application of 100 pounds of nitrate of soda per acre. The test received two shallow cultivations, the second being preceded by a side-dressing application of 150 pounds of nitrate of soda per acre. The test was harvested September 19. Early Hegari and Martin produced the highest yields in the order named. Martin is a dwarf variety and is recommended over Early Hegari because it may be harvested with a combine.

**Spacing:** A field planting of grain sorghum was made with an ordinary one-mule planter plate with 12 holes  $\frac{1}{4}$  inch in diameter. After germination the drill was solid with plants and a portion of the field was thinned or spaced, leaving small bunches of plants at hoe-width apart in the drill. Individual yield samples were taken from the spaced



and drilled portions of the field, and the yield was found to be more than 30 per cent higher on the drilled portion of the field, i.e., the portion unthinned with a hoe.

### **Cotton Varieties**

Variety and new strains tests were conducted as in previous years. The weather was unfavorable for cotton, being cool and damp during the germination and early seedling periods and rainy at fruiting time, which resulted in most of the varieties producing yields and acre values somewhat out of line with those of previous years. Because of these adverse conditions, the varietal recommendations given last year should be continued, i.e., Miller, Stoneville 2B and Deltapine being recommended on wilt-free soils and Dixie Triumph and Coker's WR-5 where wilt is a problem.

Field blocks of a large number of new strains from the breeding plots were grown and several new strains appeared promising. Further tests and field plantings will be made next year and seed of two or three of the best appearing strains will be produced for limited distribution to farmers.

### **Cotton Fertilizers**

Cooperative cotton fertilizer demonstrations based on the recommendation of 500 pounds per acre of an 8-8-8 mixture before planting were conducted on a large number of farms by the county agents of the Agricultural Extension Service in North Louisiana, and the following summary is reported by R. A. Wasson, Extension Agronomist:

"The purpose of these demonstrations was to show the advantages of using recommended fertilizer materials as to grade and quantity over fertilizer practices commonly used on farms for cotton.

Total number of demonstrations .....	83	
Average yield seed cotton all demonstrations.....	1,248	lbs. per acre
Average yield all checks.....	829	lbs. per acre
Average increase all demonstrations.....	419	lbs. per acre
Per cent increase over checks.....	50.5	

#### **"Conclusions:**

1. Cotton yields can be increased up to 60 per cent, even in an unfavorable season, by using the right grade and quantity of fertilizer.
2. Where ample plant food is provided, there is no essential difference in yields on hill, terrace and alluvial soils."

### **Sudan Grass**

A variety test of Sudan grass was planted June 18 in rows 21 inches apart and cultivated one time. The test was given a side-dressing application of 200 pounds of nitrate of soda per acre. Three clippings were made during the growing season to determine the relative forage



yielding ability of each variety. The test included Tift, Regular, and Sweet, and produced 11,186, 11,093 and 9,644 pounds of green forage per acre, respectively. The "leaf spot" disease did not develop on any of the varieties. Tift and Sweet are reported to be resistant to the disease.—*Dawson M. Johns.*

## Horticulture<sup>1</sup>

### Watermelon Breeding

The watermelon breeding program for the purpose of developing suitable varieties resistant to wilt was continued through the 1945 season. The wilt organisms are rapidly spreading throughout the sandy areas of Louisiana and some farmers reported a 75 per cent mortality rate from this disease the past season.

Considerable progress has been made in the breeding program and a suitable wilt-resistant melon should be released in a few years.

### Edible Cowpea Breeding

A large portion of the sandy land areas of Louisiana is infested with the root knot nematode and with wilt producing organisms. Each year these organisms are spreading into other areas causing a great reduction in yields in areas grown continuously in cowpeas.

A breeding program is being continued with the objective of producing edible strains of cowpeas resistant to these diseases. Considerable progress has been made toward producing disease resistant strains of edible cowpeas.

### Tomato Variety and Seedling Test

Tomato variety and seedling tests are conducted in connection with the tomato breeding program at the University Experiment Station. Although conditions existing at the beginning of the growing season weren't too favorable, high yields were recorded, with the seedling Dixie x Louisiana Gulf State ranking first and Marglobe second.

### Sweet Potato Fertilizers

The results of the sweet potato fertilizer tests conducted in five North Louisiana parishes show very conclusively that sweet potatoes cannot be grown successfully in the hill areas of North Louisiana without the application of a high-grade fertilizer such as 400 to 600 pounds of 4-12-8, which gave highest yields in the fertilizer test during 1945.

Sweet potatoes grown without the application of fertilizers produced an average yield of 60 to 80 bushels per acre, while an addition of 400 to 600 pounds of a high-grade fertilizer per acre gave yields of 150 to 200 bushels of marketable roots per acre. Therefore, an expenditure of a

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<sup>1</sup> Data obtained by P. L. Hawthorne.

few dollars per acre will increase the yields, on the average, 250 per cent and increase the monetary returns accordingly.

### **Sweet Potato Variety and Seedling Test**

The sweet potato variety and seedling test is being conducted in cooperation with the sweet potato breeding program at the University Experiment Station to determine the varieties best adapted to the North Louisiana areas.

Of the edible varieties and seedlings, the Queen Mary and Unit I Porto Rico gave exceptionally high yields of marketable potatoes; however, the seedling L-138 produced as much as 50 bushels higher yield per acre in the 1945 test.

In the starch variety test the L-127 gave greater yields per acre than the Pelican Processor.

### **Peach Fertilizers**

The results of the peach fertilizer test conducted during the 1941-1945 period show conclusively that a liberal amount of fertilizer must be applied in order to profitably produce peaches in North Louisiana. Proper fertilization increases the yield, improves the quality, lowers the cost per bushel, and increases the longevity of the orchard.

Most profitable yields were produced by the addition of 4-12-4 at the rate of 1 to 2 pounds per tree per year's age. The 4-12-4 was the only fertilizer used that contained the three major plant foods. Others used were 0-12-4, 4-0-4 and 4-12-0.—*Raymond E. Webb.*

### **Swine Production—Hogging Off Corn**

Two acres of corn produced 59.4 bushels per acre, which was hogged off by 11 market barrows and one brood sow from August 27 until November 25, a period of 90 days. The yield of pork per acre was 888 pounds, which at 13 cents per pound would be equal to \$100.34 per acre gross return. The only additional feed given was  $\frac{1}{2}$  pound of cottonseed meal per pig per day. The corn was Louisiana Hybrid 468 fertilized with 400 pounds of 8-8-8 fertilizer per acre plus 200 pounds of nitrate of soda. The market hogs made an average gain of 1.59 pounds per day.

One of the major problems in the cotton belt is that of replacing a percentage of cotton land with other types of farming. It would seem advisable to grow corn on part of this land if yields of 60 bushels per acre can be obtained. On the small cotton farm where it is desired to supplement cotton production with livestock it would seem that corn and hogs would fit into the farm program to good advantage. This experiment would indicate that hogs can be profitably fed off on upland corn.—*C. I. Bray, Dawson Johns, and J. L. Heath, Jr.*



Hogs and Corn Make Good Profits in North Louisiana

## Dairy Herd Makes High Average Record

During 1945 the grade and purebred Jersey dairy herd (9.8 milk cows) averaged 8,312 pounds of milk which tested 4.6 per cent fat and averaged 280 pounds of butterfat per cow. Because of the shortage of labor it was necessary to practice close culling within the herd; therefore, the herd was smaller than heretofore. The milking cows of the herd now consist of six purebreds and four grades. In addition, there are seven heifers, five purebreds and two grades.

No silage was produced for the herd because of the labor shortage. However, this was partially offset by the feeding of alfalfa hay, which was produced on the experimental dairy portion of the station. The alfalfa tract proved better in its second year of production than in its first year. The use of improved permanent pasture plus oats for fall, winter, and spring and Sudan grass for late summer greatly assisted in maintaining the high production level attained.

—D. M. Seath and D. M. Johns.

## Green Feed Important with Simple Rations for Hens

Satisfactory green feed crops can be maintained in the hill section of North Louisiana although more difficult to maintain than similar yards on the alluvial soils, as at Baton Rouge. Two yards per pen, each 50 feet by 50 feet in size, have provided adequate green feed at most seasons of the year for 30 hens and two male birds. Careful planning, adequate fertilizer and good seed are required to produce enough rye grass



(for winter pasture) for this number of hens in such small yards. If the season is poor, the supply will not be adequate. For this reason it is better to plan larger yards. The two yards are necessary so that the birds can be taken off the rye grass if they graze it too closely. The alternate yard makes rotation by seasons possible, e.g., to yard with bermuda grass and lespedeza during the summer-fall season. Chickens will make good use of pasture when given the opportunity. Winter pasture is especially important when simple rations are used.

The hens receiving a ration with cottonseed meal as the only source of protein laid exceptionally well this year. The average production for ten months was 156.9 eggs per hen—only one egg less than the birds receiving a “complex” (or multiple protein source) mash and nine eggs more than those in the soybean meal pen. The soybean meal pen usually has been relatively higher and the cottonseed meal pen lower than this year. At any rate, the results this year show definitely that hens fed cottonseed meal can and will lay well *when good green feed* is supplied. To avoid olive yolked eggs, 1 per cent ferrous sulphate is added to the cottonseed meal used in the mash.

To further demonstrate the value of green feed when the hens get an extremely simple ration, two pens are receiving mash composed of one-third cottonseed meal and two-thirds yellow corn meal. One of these pens gets no green feed except the grass that grows in the yards, while the other has rye grass for winter pasture. The results will be of interest to many farmers.

Again this year, the pen fed “free-choice” with 32 per cent protein-vitamin supplement and corn and oats consumed less protein, 13.5 per cent, than the other pens with approximately 15.5 per cent. Even with this lower protein consumption the average egg production was within six eggs of the best pen. The body weight of the hens in the 32 per cent supplement pen averaged higher than that of hens in other pens, particularly during the summer months.

—C. W. Upp, J. L. Heath, and D. M. Johns.

## Turkeys Profitable in North Louisiana<sup>2</sup>

The first year in which turkeys were produced at the North Louisiana Station was quite successful. Four hundred and fifty turkey hatching eggs (broad breasted Bronze) were purchased from a Texas breeder and shipped to Monroe, where they were hatched on April 23 in a commercial hatchery. Three hundred and eight poults were hatched. They were divided equally and were brooded in two 10 feet by 12 feet brooder houses with wire-floored sun porches of the same size. Canopy type oil burning brooders were used. At nine weeks of age the poults

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<sup>2</sup> O. E. Goff, B. A. Tower, and D. M. Johns worked a great deal on this project while C. W. Upp was away.



were divided into five groups (lots), three of which were grown out on pasture in range shelters. The other two lots were kept in the brooder houses throughout, i.e., grown in confinement.

### **Mortality**

The mortality was 7.8 per cent for the first nine weeks, and the mortality and culling from day-old to 28 weeks of age was 14.3 per cent. This compared favorably with the 22.5 per cent loss recently released as the average loss of poults in the entire United States last year. The five-year average for the United States is 27.6 per cent. Of those lost from our flock, 10 per cent were accidentally killed, 35 per cent culled for such causes as breast blisters, pendulous crop and undersize, 20 per cent died because of the heat, and for 35 per cent the cause was undetermined.

### **Average Weights**

The average weight of the females at 28 weeks of age was 16 pounds and of the males, 25.8 pounds.

The poults were all fed a commercial turkey starting feed for the first nine weeks. Three different rations were used thereafter, one with a complex mash with numerous ingredients, another a simple mash (few ingredients), and a third was a commercial or manufactured 32 per cent protein-vitamin supplement. All of the lots had access to corn and oats free-choice in addition to the mash. No great differences in final weights were obtained with the different rations. The heaviest males were in the lot on range with complex mash, the average weight being 26.6 pounds. The other lots averaged within .6 pounds of this except those grown in confinement with 32 per cent supplement, the average weight of which was 24.4 pounds. This is accounted for at least in part by the fact that insufficient grain feeders were provided in this pen. The females of this same lot were heavier than those in any other. The lightest females were those fed the simple ration on range, their average weight being 15.7 pounds. The females in the other pens averaged 16 pounds.

### **Feed Consumption and Margin Over Feed Cost**

Very important questions in producers' minds are: (1) How much feed was required to grow the turkeys, and (2) what was the margin over feed cost? The average feed consumption per turkey in all lots was 118 pounds with an average weight of 20.8 pounds. This means that 5.7 pounds of feed were required to produce a pound of turkey. The feed cost per turkey averaged \$4.15, and the market value per turkey (at wholesale O. P. A. ceiling price) was \$6.90, or a margin over feed cost of \$2.75. Feed consumption was higher, 31.5 pounds per turkey, for the confined lots as compared to those on range. Feed wastage was somewhat greater in the confined pens but the main difference in feed consumption must be credited to the value of the pasture for the lots

grown on range. Largely because of the difference in feed consumption, the turkeys grown on range made a return of \$3.33 per bird over feed cost, while the return over feed cost for those grown in confinement averaged \$2.02 each.

### **Grading and Dressing**

The turkeys were all graded alive and subsequently ten toms and ten hens from each pen were killed and dressed, and again graded as to finish. No great differences were found in the turkeys from the different pens. All of them graded quite high. The losses in weight due to dressing and drawing were recorded for the birds slaughtered. The chilled dressed weight of the males averaged 92.4 per cent of the live weight; for the females it was 92.7 per cent. The drawn weight, including giblets, averaged 80.8 per cent of the live weight for the males and 81.0 per cent for the females.—C. W. Upp and J. L. Heath.

## *Rice Experiment Station, Crowley<sup>1</sup>*

*J. Mitchell Jenkins, Superintendent*

### **Culture**

#### **Fertilizer Experiments**

Included in the fertilizer experiments were: (1) A complete 8-10-6 fertilizer, with three sources of phosphorus applied at the rate of 400 pounds per acre; (2) Applications of straw with and without a complete 8-10-6 fertilizer applied at the rate of 400 pounds per acre; (3) Method of application and, (4) Effect of  $1\frac{3}{4}$  tons of rice straw applied to the land in alternate years.

#### *Sources of Phosphorus*

This experiment was conducted with rice grown in alternate years on land rotating every four years with a like area that had been devoted to an improved pasture for four consecutive years. The same fertilizers that were applied to the rice crop also were applied in alternate years to the plots devoted to improved pasture. The beneficial effect from the improved pasture is indicated by the rather high 8-year average yield of 58.6 bushels per acre from the check plots.

The 8-year average (1937-1945 less 1940) yield of rice for T.V.A. treble superphosphate was 74.4 bushels; for T.V.A. fused phosphate, 74.0 bushels; and for bone meal, 70.4 bushels per acre. In the order

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<sup>1</sup> Cooperative experiments with the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

listed, the increase in yields as compared to the check plots was 15.8, 15.4, and 12.3 bushels per acre, respectively. These results indicate that the three sources of phosphorus were about equally good.

#### *Effect of Straw with and without Fertilizer*

The 7-year (1938-1945 less 1940) average increase in yield of rice grown in alternate years, following straw alone, was 5.8 bushels, and the 8-year (1937-1945 less 1940) average yield following straw plus a complete fertilizer, was 14.8 bushels per acre. The 8-year average yield of the check plots was 46.3 bushels per acre.

The 7-year (1938-1945 less 1940) average increase in yield of rice grown on land cropped *each* year following straw plus fertilizer, was 15.3 bushels per acre. The 7-year average yield of the check plots was 39.3 bushels per acre.

#### *Effect of 1 $\frac{3}{4}$ Tons of Rice Straw Applied to the Land in Alternate Years*

The straw was applied to the plots in the winter. In Treatment 1, the straw was allowed to remain undisturbed until plowed under the following fall in preparation for spring seeding; in Treatment 2, the straw was turned under after it was applied; and in Treatment 3, the straw was disked in but not plowed under in seedbed preparation. All plots, including the check, were fertilized with a 6-8-4 formula at the rate of 200 pounds per acre at seeding time. In 1945, the average yields were: Treatment 1, 72.5 bushels per acre; Treatment 2, 67.2 bushels; Treatment 3, 64.1 bushels; and for the check, 72.2 bushels per acre. The reduced yields in Treatments 2 and 3 are probably due to a shortage of nitrogen as a result of competition for this element between the rice plants and the organisms involved in the decomposition of the straw.

#### *Method of Application*

In 1945, the application of 200 pounds per acre of 8-10-6 fertilizer with the seed and 200 pounds 8 weeks after submergence produced 8.7 bushels more per acre than when the total amount, 400 pounds, was applied with the seed. In the 6-year period (1939-1945 less 1940), the average increase in yield for the split application was 7.6 bushels per acre more than when the total amount was applied with the seed. The average yield from the check plots during this period was 49.3 bushels per acre.

In 1945, the highest average rice yield, 32.4 bushels per acre, was from the plots to which the fertilizer was applied after draining the field. The plots that received the fertilizer on the water ranked second, with a yield of 32.1 bushels per acre. The average yield from the plots that were fertilized at the time of seeding was 26.7 bushels, or 3.1 bushels above the average yield of the check plots.

The highest 3-year (1943-1945) average yield of 33.6 bushels per acre was from the plots that were drained before the fertilizer was applied. The second highest yield of 31.0 bushels was from the plots to which the fertilizer was applied on the water. The 3-year average yield from the plots that were fertilized at the time of seeding was 26.9 bushels, or 1.6 bushels above the average yield of the check plots.

## **Rotation Experiments**

### *Two-Year Rotation*

In 1945, the highest average rice yields in eight 2-year rotations were: following clean summer fallow, 26.4 bushels; Barchet soybeans, 25.5 bushels; and following *Crotalaria spectabilis*, 24.5 bushels per acre.

The crops or treatment that alternated with rice and the 11-year (1934-1945 less 1940) average rice yields were as follows: Red clover on rice stubble, 44.6 bushels; Italian rye grass on rice stubble, 44.6 bushels; clean summer fallow, 44.1 bushels; Barchet soybeans followed in fall by Bur clover, 43.8 bushels; Barchet soybeans alone, 43.8 bushels; native pasture, 42.8 bushels; *Crotalaria spectabilis*, 42.7 bushels, and cotton dusted with calcium arsenate until 1941, replaced in 1942 by oats and Alyce clover, 32.9 bushels per acre.

### *Two-Year Rotation to Determine the Effect of Fertilizer on Rice Yields Following Lespedeza*

In 1945, the yield of rice following lespedeza fertilized was 46.8 bushels and not fertilized, 40.3 bushels per acre. The 3-year (1943-1945) average yields for the fertilized and not fertilized plots were 32.6 and 27.8 bushels per acre, respectively.

On July 6, 1945, very good stands of volunteer lespedeza were noted in plots where rice was grown in 1944. This indicates that lespedeza under favorable conditions will reseed itself in alternate years with rice, provided it is seeded for two or three years and enough seed remains on the land and becomes widely distributed throughout the soil by subsequent plowings and seedbed preparations for rice.

## **Residual Effect of Calcium Arsenate on Rice Yields**

In 1945, the average rice yield of 40.2 bushels per acre from plots that had not been dusted with calcium arsenate, was 5.6 bushels more than from plots that were dusted.

The 10-year (1935-1945 less 1940) average yield of 41.0 bushels of rice per acre from plots that had not been dusted with calcium arsenate was 9.6 bushels greater than the average yield from plots that had been dusted with calcium arsenate.



# Rice Varietal Improvement<sup>2</sup>

## Expansion of Program

Rice improvement work was expanded in 1944 and 1945 to include outfield testing of promising selections, and seed increase of new varieties. This was made possible by the assignment of a technical assistant to the project by the Director of the Louisiana Experiment Station. The crossing, selection, and testing program at the Rice Experiment Station has been discussed in previous reports. During the past two years outfield nursery yield tests were conducted; new varieties were grown on farms in one- or two-acre patches, and the first farm fields of new varieties were inspected. The cooperation of farmers and county agents has been an essential part of these new activities.

## Ten Promising New Selections

The unnamed selections described below, which were selected from crosses made at the Rice Experiment Station, have reached the stage for final testing. Seed of these has been or will be increased to provide seed for release to farmers for growing under contract on small fields. Four selections or varieties were tested on fields in 1944 and 1945, but two of them have since been withdrawn because they were not wholly satisfactory. Seed of two other varieties, Kamrose and Culosa x Blue Rose, 2913A29-1, were supplied to farmers for trial, but these also failed to qualify as prospective standard varieties.

### *Early Selections*

Selections, Number 6-250, from the cross 2913A5-1-3 (Colusa x Blue Rose) x AL11-1 (Shoemed x Fortuna), are vigorous, have smooth hulls, and differ somewhat in maturity, height, shattering, and grain size. The grain of these selections is somewhat shorter than that of Blue Rose and should be of excellent milling quality.

### *Midseason Selections*

Selection, Number 6-251, from the cross 283A10-1-1-3 (Edith x Fortuna) x AL11-1, are similar to those of Number 6-250 and perhaps have more desirable grain types.

Selection Number 4-130, from the cross 283A3-6-2 (Edith x Fortuna) x C. I. 4440, is a medium-grain of good yielding capacity and it has shown some resistance to stem rot.

Selection Number 322A6-23, from the cross Rexoro x Fortuna, has a short straw, is easy to thresh, and matures about the same time as For-

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<sup>2</sup> Cooperative experiments with the Louisiana Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Engineering, Agricultural Research Administration, United States Department of Agriculture.

tuna. Shelling tests indicate that it should give a high yield of head rice for a long-grained variety. About two acres were grown by one farmer in 1945 and his report was very favorable.

#### *Midseason to Late Selections*

Selection Number 3-I-9-2-4, from the cross Blue Rose x Rexoro backcrossed to Blue Rose, is similar to Blue Rose in plant and grain type, is smooth-hulled, and matures about three days later than Blue Rose. It is very resistant to diseases.

Selection Number 6-I-25-12, from the cross Blue Rose x Rexoro backcrossed to Blue Rose, is a short stiff-strawed, smooth-hulled, easy threshing variety, about a week later than Blue Rose. It has an excellent medium grain, slightly smaller than that of Blue Rose, and it is very resistant to diseases.

Selection Number 3-72-3, from the cross Rexoro x Purple Leaf, is a vigorous, smooth-hulled, plump, long-grained type, similar to Rexoro in plant growth but earlier.

Selection Number 3-II-1-24, from the cross Blue Rose x Rexoro backcrossed to Rexoro, is a smooth-hulled type of about the same maturity as Rexoro. It shatters less readily than Rexoro and has an excellent, clear, long slender grain.

Several selections, Number " $\frac{7}{8}$  Rexoro," from the cross Blue Rose x Rexoro backcrossed twice to Rexoro, are very similar to Rexoro in plant and grain type. Several strains are available, some of which are earlier than Rexoro and also are resistant to the new race of *Cercospora oryzae* leaf spot disease to which Rexoro is susceptible.

Selection Number 3-I-2-25, from Blue Rose x Rexoro backcrossed to Blue Rose, has a very stiff straw, is easily threshed, and has a Blue Rose grain type, but it is later and matures at about the same time as Rexoro. About an acre of this selection was grown by a farmer in 1945.

—N. E. Jodon and D. J. Comeaux.

# *United States Department of Agriculture*

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## *Bureau of Entomology and Plant Quarantine*

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### **Search for Substitutes, Adjuvants, and Reduced Dosages for Rotenone and Pyrethrum for Control of Insects Attacking Cole Crops Shows Promise<sup>1</sup>**

The search for substitutes, adjuvants, and reduced dosages for rotenone and pyrethrum for controlling cabbage caterpillars and the turnip aphid was continued during 1945. Among the materials tested, DDT was given special attention because of its very promising results during 1943 and 1944.

In the spring experiments during 1945, on cabbage caterpillars, DDT dust mixtures at 1, 3 and 5 per cent strengths were compared with mixtures containing 0.75 per cent of rotenone and 10 per cent of sabadilla. Applications were made at approximately 20 pounds per acre at intervals of 7, 14, and 21 days from the time the infestation developed until harvest. The infestation was light and the 14- and 21-day applications of the 3 and 5 per cent DDT were effective, but not so effective as the 7-day applications. The sabadilla was relatively ineffective. The results were in line with those of previous tests in that the 3 and 5 per cent DDT dusts were more effective than 0.75 per cent rotenone dust.

In the fall experiments the 1 and 3 per cent DDT dusts were compared with undiluted cryolite and with a mixture containing 95 per cent of calcium arsenate and 5 per cent of Paris green. The applications were made at 10- and 14-day intervals from the time the first pair of true leaves appeared until the plants began to head. The plots were heavily infested with the cabbage looper and the fall armyworm, or "grass worm." None of the treatments gave satisfactory control. There was no indication that any of the treatments killed any of the fall armyworms, and the highest control of the cabbage looper was only 60 per cent. The unsatisfactory control may have been due to excessive rainfall during the period of application (which was begun August 6), to

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<sup>1</sup> In cooperation with the Louisiana Agricultural Experiment Station and Louisiana State Department of Agriculture and Immigration.

high temperatures, to sunlight, to the caterpillar population, or to a combination of these conditions. The inadequate control with undiluted cryolite and the arsenicals makes the results questionable.

Spring and fall experiments were also conducted to find a substitute or reduced dosages for rotenone for the control of the turnip aphid. DDT, rotenone, sulfur, light mineral oil, and three forms of nicotine were used at about 20 pounds per acre at 10-day intervals until maturity of the crop.

The 5 per cent and 10 per cent DDT dust mixtures did not control the turnip aphid. One per cent of rotenone with 38 per cent of sulfur was the most effective treatment, and this was significantly better than 0.75 per cent of rotenone plus 38 per cent of sulfur, and 0.75 per cent of rotenone plus 2.0 per cent of oil, but was not superior to 0.5 per cent of rotenone plus 1.0 per cent of nicotine derived from a proprietary dry concentrate containing both nicotine sulfate and nicotine alkaloid. There was no significant difference in the results obtained with dust mixtures containing 2 per cent of nicotine derived from nicotine sulfate, nicotine alkaloid, or a mixture of the two.

The new insecticide benzene hexachloride was effective in preliminary tests against the green cabbage caterpillars and the turnip aphid, but caused slight injury to cabbage plants. Further work is being conducted with this material. Its chief drawback is its offensive lingering odor.

—K. L. Cockerham, O. T. Deen, and P. K. Harrison.

## Sweet Potato Weevil Investigations<sup>2</sup>

During 1945 investigations on the sweet potato weevil were continued along lines similar to those in effect during the preceding year. Phases of the problem studied were (a) insecticides for use in the field and in storage, (b) herbicides for destroying vines before harvest, (c) new sweet potato varieties or crosses for weevil resistance, (d) the use of mechanical harvesters for cleaning fields of potatoes during the harvesting process, and (e) toxicity of chemicals in poison baits.

Owing to a very light weevil infestation, no additional data were obtained on insecticide control in the field, but DDT in residual form in storage houses, on stored potatoes, seed, and refuse dumps, was very promising. DDT in kerosene and benzene solutions and in kerosene emulsion, at 1, 3, and 5 per cent strengths, and in dust mixture at 10 per cent strength were very toxic to adults crawling over treated surfaces for several weeks after treatment. Approximately 1 pound of DDT was applied per 3,000 cubic feet of storage space. The 5 per cent strength in benzene, the most effective of these treatments, was toxic for 27 weeks. When the 10 per cent dust was applied to infested potatoes, all adults were killed after they crawled over the treated potatoes and crates.

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<sup>2</sup> In cooperation with the Louisiana Agricultural Experiment Station and Louisiana State Department of Agriculture and Immigration.



Ammonium sulfamate and dinitro-o-sec-butylphenol were the best herbicides tried for killing sweet potato vines before the harvest, but 2,4-dichlorophenoxyacetic acid and the sodium salt of this material penetrated the roots better and caused more decay than the others. This indicates that the first two materials named may be suitable for killing sweet potato vines and the last two for eradicating volunteer sweet potato plants and wild host plants.

In a weevil-resistance test, using nine new sweet potato varieties or crosses, selection number 32-10-5 was less infested than the others, but further tests are necessary before any conclusions may be drawn.

In one small field test it was demonstrated that sweet potatoes may be successfully harvested with a mechanical harvester and that fields are left much cleaner than when they are harvested with a horse-drawn plow. The use of a mechanical harvester should reduce the winter carry-over of weevils in infested fields.

Twenty-five chemicals were tested in poisoned baits against weevil adults, and the most promising of these were also tested on plants. Paris green, sodium fluosilicate, and 2,4-dinitrophenol were the most toxic materials tested.

*K. L. Cockerham, P. K. Harrison, and O. T. Deen.*

## *Bee Culture Investigations*

The Southern States Bee Culture Laboratory, a field station of the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture, was established cooperatively with the Louisiana State University in 1928 and is concerned with beekeeping problems common to the Southern States.

## **Damage to Combs in Beehives**

In addition to damage to combs by wax worms and mice, many combs are injured by the bees themselves. Three types of damage are common: (1) Irregular, curved areas are chewed from the lower corners of frames near the hive entrance; (2) the entire bottom of the comb is destroyed so that a space  $\frac{1}{4}$  to  $\frac{1}{2}$  inch wide is left above the bottom bar; and (3) irregular areas of worker cells are chewed to the midrib and replaced by drone cells, or less frequently rebuilt as worker cells. Any injury to combs decreases the area available for egg laying or for storage of nectar or pollen and, if combs are not firmly attached to the wooden frame at the bottom or ends, more damage results from handling of the combs by the beekeeper.

It has been found that gnawing of the lower corners of combs near the entrance is decreased if the entrance is darkened. A thin sheet of metal laid across the bottom board so that it extends 4 to 6 inches beneath the first hive body appears to be effective.

A shallow super of combs placed below the brood chambers helps to prevent damage from gnawing of corners or along the bottom bar of brood combs. The shallow supers are seldom used for storage of either nectar or pollen, except perhaps temporarily, and the queen seldom lays eggs in them. After a year of use the shallow combs are often reduced to irregular comb masses and evidently serve as clustering areas for field bees.

The third type of comb damage, in which sections of comb are removed to the midrib and then rebuilt, is not well understood. It resembles the work of bees in removing disease. Sometimes the same area may be reworked more than once. Since this type of damage seems to be most common in periods after the main honey flow, when large numbers of bees are idle, field bees clustered at night or idle bees after a flow may be responsible.—*Warren Whitcomb, Jr.*

## Package-Bee Production Often Limited by Hive Space

In studies in cooperation with commercial shippers it was found that colony development is often limited by lack of room. A colony with adequate stores of honey and pollen, or supplied pollen cake, cannot reach maximum population in less than three full-depth hive bodies. In colonies confined to two deep bodies, maximum populations were approached only in those colonies with honey reserves so low that practically all comb space was available to the queen. Generally where honey and pollen reserves were adequate, colonies in two-story hives became crowded and began swarm preparations before the start of the shaking season. Provided the queen and stores are adequate, increased production of bees can be obtained by use of larger hives.

—*Warren Whitcomb, Jr.*

## Queen Losses in Honey-Production Apiaries

For the last four years queen losses have been observed in an apiary used for production of honey. Each year these colonies have been requeened with sister queens all obtained from a single queen breeder. In 1942 out of 30 queens used, 22 failed during the season; in 1943 out of 30 queens, 24 were missing at the end of the season; and in 1944 and 1945, out of 40 queens each year, 15 and 17 failed by the end of the honey flow. Since very few queens failed during February and March, when colony development must be rapid if a spring crop is to be gathered, the effect of queen loss is not so serious as the numbers lost might indicate. However, if failing queens are not replaced promptly by normal supersedure or by requeening, crop losses can be expected.

—*Everett Oertel.*

## Artificial Insemination of Queen Bees

The artificial insemination technique has been used with queen bees for several years. For the last two seasons inseminated queens have performed as well in honey-producing colonies as have naturally mated queens. However, there has been a delay of approximately 30 days between the time of insemination and the start of egg laying. During this period bees have treated the queen much as they would treat a virgin, and queen losses have been high. It has been found that anaesthetizing the queen with carbon dioxide during the two or three inseminations necessary to assure a full mating will cause her to start egg laying as soon as do naturally mated queens. Further studies are under way, but it is believed that artificial insemination of queens can now be used on a much wider scale than had been thought possible.

—Otto Mackensen.

## Location of Colonies in the Apiary

For the last four years honey-producing colonies have been arranged in four parallel rows. Rows 1 and 2 face the east and rows 3 and 4 face the west. There are usually 8 colonies in each row. In this period row 1 has had the largest yield, row 3 has been second in yield and rows 2 and 4 have alternated in the third and fourth positions. It is, therefore, possible that position of the colony in the apiary may influence the size of the honey crop. Queen breeders or honey producers who select breeding stock on the basis of production should be certain that location of the colony in the apiary is not influencing their choice of breeding stock.—Everett Oertel.

## *Bureau of Plant Industry, Soils and Agricultural Engineering*

### *Irish Potato Breeding*

The work of the Federal Irish potato breeding program in the Southern States has advanced to the stage where seedlings possessing a considerable degree of resistance to scab and early blight have been found. However, none of the selections being tested has all the other characters desired, so that further breeding work is necessary in order to combine all of these characters in one seedling-variety.

### **Disease Resistance**

A number of seedlings have been produced that possess a marked degree of resistance to scab. One of these seedlings, a white-skinned type, yielded as well as did Katahdin from Louisiana spring-grown seed. In addition it was about the same as Katahdin in cooking quality. Several seedlings were selected that were only slightly affected by early blight.



The above seedlings will form the basic material for further breeding in an effort to secure new seedlings possessing resistance to both scab and early blight as well as being of good yielding ability.

### **Adaptability of New Seedlings and Varieties**

As in previous years, small lots of new seedlings were sent to most of the Southern States for further selection under local conditions. A white seedling that was highly resistant to late blight in Texas was a particularly heavy yielding sort in Texas. As soon as additional seed of this seedling and others can be grown in the North further yield tests will be made in Louisiana.

Teton, a newly released variety that is highly resistant to ring rot, has been found to be inferior to Katahdin in yield tests for two years at Baton Rouge, Louisiana. This is a white-skinned variety.

Menominee, a scab-resistant variety which has recently been named and released, was found to yield about as well as Katahdin last season at Baton Rouge, Louisiana. This is a white variety and late in maturity.



Leaf on left from one of many potato seedlings found to possess some resistance to early blight. Leaf on right from a very susceptible variety.

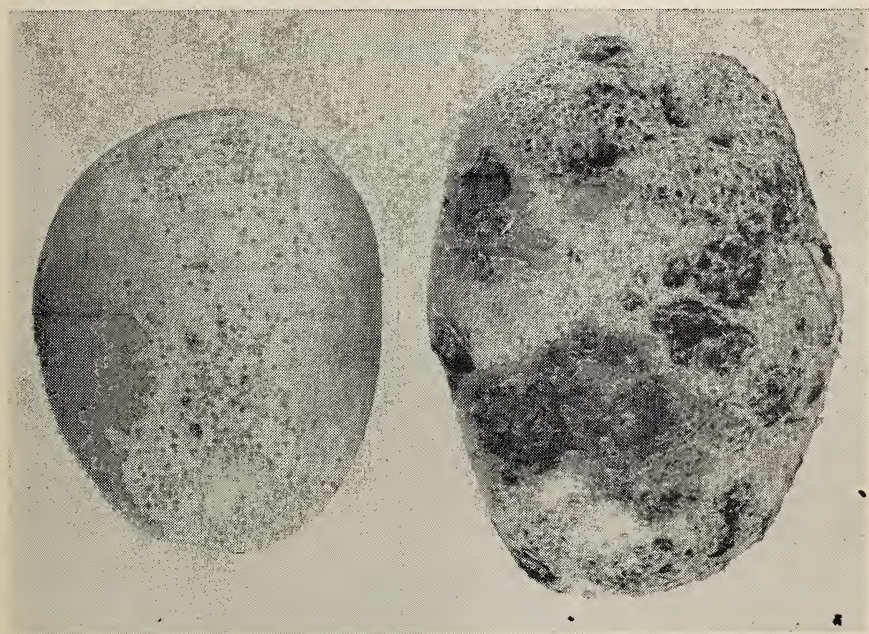


## Locally Grown Katahdin as a Source of Seed

For several years a number of growers in Louisiana have been using home-grown Katahdin potatoes for seed the following year. From spring to spring the seed is kept in commercial cold storage. By so doing they have eliminated the necessity of purchasing new certified seed from the North each year.

A lot of Katahdin seed stock was located near Alexandria, Louisiana, that had been grown in Louisiana for 9 consecutive years without recourse to new seed. A test was made to determine the yielding ability of this seed as compared with new certified seed at Baton Rouge, Louisiana, last year. The 9-year-old seed yielded 201 bushels of No. 1 tubers in comparison with 309 bushels from the new certified Katahdin seed.

Additional tests should be made of locally grown seed before definite conclusions can be made, but from this test it appears that a marked reduction in yielding ability resulted from maintaining this seed stock so long in Louisiana.—*E. L. LeClerg.*



Tuber on left produced by a potato seedling that possessed a high degree of resistance to scab. Contrast this with the very susceptible variety represented by the tuber on the right.

## *Corn Hybrids*

The corn breeding program at the Louisiana Agricultural Experiment Station is conducted in cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture.

Corn hybrids developed in this program are adapted to Louisiana and continue to produce substantial increases in yield over the open-pollinated varieties. Various comparisons conducted throughout the state show that the hybrids produce an average gain of 14 bushels per acre over the average of high and low yielding open-pollinated varieties. Corn production is increasing in Louisiana as indicated by the fact that approximately 70,000 acres were planted in 1945 with seed of hybrid corn. The increased yield was about one million bushels, which was valued at \$1,300,000.

Thirty-one seed producers, representing various sections of Louisiana, cooperated in producing hybrid seed corn. Most of them were successful and produced good yields of high quality seed. A few fields were abandoned on account of high water and some were almost failures due to excessive moisture. Seed of five leading Louisiana hybrids adapted to the different areas of the state are available for planting in 1946. White hybrids 468, 518 and 3802 are suited to the northern part of the state. White hybrid 518, which has good weevil resistance, also is adapted to central and southeastern Louisiana. Hybrid 1031, with yellow, white-capped kernels, is suited to the entire state on soils of high fertility. Seed of Hybrid 1030 is not available for planting in 1946, but it is expected that seed of this hybrid will be available for distribution in 1947. Hybrid 1030 has excellent weevil resistance and is well suited for mechanical harvesting. Hybrid 2909 is adapted to the lower Red River and lower Mississippi River alluvial soils.

Although good hybrids are now in production, the study and testing of new breeding materials is in progress in order to determine better hybrids than those now available.—*Hugo Stoneberg.*

## *Cotton Investigations*

### **Cotton Disease Studies**

#### **Seed Treatment Improves Stands by Reducing Seedling Disease Damage**

These investigations were continued the past year by the Division of Cotton and Other Fiber Crops and Diseases, U. S. Department of Agriculture, in cooperation with the Louisiana Agricultural Experiment Station, and represent part of a regional test being conducted throughout the states of the main cotton belt. The primary objective of the investi-



gations is to obtain information that may be utilized by the grower to insure good stands of cotton, an important requisite in profitable production. Studies are made in field plantings of those chemicals which in preliminary greenhouse tests have shown promise in reducing seedling disease losses. Other aspects of the work are rates of treatment for optimum emergence and comparisons of the effect of treatment of regular ginned (fuzzy) and machine delinted (reginned) seed lots on stand improvement. In 1945 six dust treatments were compared at three treatment levels, using fuzzy and reginned seed stocks grown in North Carolina in 1944. These stocks were heavily infested with the anthracnose fungus, an important seedling disease in the Southeast.

The effect of the various treatments and treatment rates on seedling stand at Baton Rouge, as calculated from the per cent emergence 18 days after planting, are shown in Table 1. In the order named, DuBay 1452F, Dow B, Dow A and Ceresan 5 per cent gave the best stands of seedlings, all of which were highly significant over untreated seed. For the above chemicals 1.5 ounces per bushel appears to be about the optimum rate for cottonseed. In former years the reginned seed treatments have usually given higher emergence values and better seedling survival, but in the 1945 tests, with the exception of the Isothan and one DuBay 1452F and two Dow 9B treatments, the values for the fuzzy seed were higher.



Seed Treatment Test Plots at Baton Rouge, Louisiana.  
Row at A and rows at left of A planted with treated seed; row at B and rows at right of B planted with untreated seed. Season, 1945.

TABLE 1. COTTONSEED TREATMENT—TEST C. BATON ROUGE,  
LOUISIANA. YEAR—1945

Seedling stand 18 days after planting\* following treatment of seed lots  
with various chemicals at rates indicated. Seed lots  
Coker 100, North Carolina

Treatment		Fuzzy					Reginned					Treat- ment Mean
		Replications				Mean	Replications				Mean	
		1	2	3	4		1	2	3	4		
		%	%	%	%	%	%	%	%	%	%	
Ceresan 5%	—3 oz.†	63.4	68.9	61.5	65.9	64.9	45.1	33.6	52.7	42.3	43.4	
"	1.5 oz.	67.6	62.9	79.4	69.2	69.7	37.1	34.5	58.6	53.2	45.8	
"	3/4 oz.	77.4	61.0	75.5	60.3	68.5	46.1	30.4	58.0	54.7	47.3	
Dow 9 A†	—3 oz.	57.5	56.8	83.1	63.5	65.2	48.5	35.6	65.2	48.7	49.5	
"	1.5 oz.	54.1	57.8	79.3	71.6	65.7	43.0	46.4	66.2	47.7	50.8	
"	3/4 oz.	58.7	53.6	74.9	75.2	65.6	43.2	35.2	74.9	36.2	47.3	
DuBay 1452F	—3 oz.	47.2	71.6	63.4	57.0	59.8	39.1	54.9	47.0	46.5	46.8	
"	1.5 oz.	72.3	61.7	86.3	69.6	72.4	80.0	86.8	70.3	67.5	76.1	
"	3/4 oz.	67.8	53.0	82.2	74.9	69.4	47.8	74.5	63.8	50.0	59.0	
Dow 9 B**	—3 oz.	54.3	48.8	71.9	73.4	62.1	43.3	50.9	59.6	50.7	51.1	
"	1.5 oz.	55.6	86.3	66.2	67.0	68.7	68.4	70.8	60.3	80.2	69.9	
"	3/4 oz.	52.7	67.0	65.8	58.5	61.0	59.5	64.6	55.2	70.7	62.5	
Mersolite	—3 oz.	46.2	48.2	72.3	67.1	58.4	34.3	38.5	61.8	42.9	44.3	
"	1.5 oz.	71.6	44.5	65.6	64.5	61.5	35.7	40.4	60.4	52.6	47.2	
"	3/4 oz.	33.6	50.0	57.2	57.7	49.6	40.6	38.4	54.2	40.7	43.4	
Isothan	—3 oz.	38.8	20.9	65.3	33.0	39.5	28.7	53.6	63.6	39.6	46.3	
"	1.5 oz.	31.5	21.8	65.0	25.3	35.9	38.0	54.0	63.4	31.5	46.7	
"	3/4 oz.	38.9	16.9	69.5	58.4	45.9	34.9	53.0	50.2	54.9	48.2	
Untreated		38.3	42.9	50.2	60.2	47.9	19.3	37.7	43.9	24.2	31.2	
Difference required for significance—5% point.....						19.2	.....	.....	.....	.....	19.2	
1% point.....						25.5	.....	.....	.....	.....	25.5	

\*Planted April 30 and May 1

†Ounces per bushel

‡Per cent toxicant in dust—50

\*\*Per cent toxicant in dust—25

Seed type mean: Diff.

Fuzzy = 59.5

Reginned = 50.4 9.1

L.S.D. = 6.5

## Fusarium Wilt

### Roguing and Selection for Wilt Resistance

This work was continued along much the same lines as previously reported. The method of obtaining satisfactory resistance has been that of testing roguing and selection over a three-year period. This has been accomplished with a hybrid, Dixie Triumph x Deltapine, and the same procedure is now being used with a semi-resistant line of Stoneville 2B. Infected plants are rogued at 15-day intervals from June to





Wilt-Resistant Variety Study at Baton Rouge, Louisiana.  
Test plots of Dr. H. B. Brown, Plant Breeder and Agronomist. Variety at left, resistant; center, highly susceptible; right, highly resistant. Season, 1945.

September on uniformly infested land. Outstanding, healthy plants are tagged and roots also examined at harvest for vascular discoloration. The best disease-free plants, especially those having good staple length, high lint per cent, and other desirable fiber properties, are selected and progenies of these selections studied again in plant-to-row tests for resistance. Some of the progenies of the Dixie Triumph hybrid were tested for yield and resistance the past season and made a satisfactory performance. It would appear that some of these strains are now ready for increase and ultimate release for use in wilt-infested districts.

### *Inheritance of Wilt Resistance*

Work preliminary to these investigations was begun last season. Crosses were made between resistant and susceptible lines, all inbred for several years, and included varieties of long, short, and intermediate staple lengths, respectively. As a result of artificial inoculation of field plots from 1938 to 1942, with the wilt fungus, *Fusarium vasinfectum*, we now have available uniformly infested soil for inheritance studies at this Station. The  $F_2$  and  $F_3$  generations of some of these crosses and parental lines also are being utilized in connection with studies of their reaction to fusarium wilt extracts, a new approach for quickly determining resistance.

## *Chemical and Microbial Studies of Soil from Wilt-Free and Wilt-Infested Areas of the Same Field*

To determine the factors which favor the prevalence of wilt in certain areas of fields and its absence in others, chemical analyses and studies of the microflora of the soil of these areas have been made. Chemical analyses of the soil from a sharply defined healthy area and an adjoining heavily infested area were made at the suggestion of the writer by Dr. W. J. Peavy of the Crops and Soils Department. These analyses reveal striking differences. The soil in the healthy area is high in available phosphorus, potassium and calcium, with reaction near neutral pH 6.9, whereas, in contrast, that in the infested area is extremely low in phosphorus, 50 per cent lower in both potassium and calcium, with reaction acid—pH range 5.2—5.7. Analyses for nitrogen and organic matter also are being made, but as yet are incomplete.

Studies of the microflora of the same soil areas also have been made to determine whether organisms antagonistic to the fusarium wilt fungus might be involved. The dilution plate method was employed, and, for isolation and culture of the various soil organisms, Conn's glycerine asparaginate agar and potato-dextrose agar were employed in Petri plates with soil dilution ranges from 1:10,000 to 1:300,000. Several species of actinomycetes and one bacterial organism have been isolated from the soil of the healthy area which are antagonistic to fusarium wilt when tested on agar plates. While several actinomycete spp. also have been isolated from the soil of the infested area, no clear-cut antibiotic forms have been encountered. The studies suggest that development of agronomic practices favoring microbial antagonisms may offer a practical line of attack against fusarium wilt as well as other soil parasites of cotton.—*D. C. Neal.*

## **Cotton Varieties**

Hopi crosses were tested in 1944 in comparison with some of the better upland strains, and they made a fair showing. However, the size of the boll of these strains proved comparatively small. Further selection has improved this fault and several strains have been selected having much larger bolls. Some of these strains show exceptionally good strength when tested with the Pressley strength testing machine.

The Stonewilt x Hopi progenies were the most promising, but a few of the Deltapine x Hopi strains were retained for further selection because of the better boll size and high lint percentage.

The four best strains of D. & P. L.-Dixie Triumph cross were tested in the new strains test at Baton Rouge and showed up well. Two of these, 55 x 829-47-3-7-9 and 55 x 829-33-2-9-10 will be increased for release to the farmers in 1947. These strains ranked third and sixth in a test of 21 strains.

Selections in Stoneville 5 x Punjab were omitted last season because of labor shortage but stocks were retained and will be planted this year. Punjab was one of the high-yielding strains in the regional exchange study the past season, indicating further selection in this strain.

Other selections will be made in several hybrid strains in the selfed lines.

Some 70 selfed lines of regional interest were grown this year and self-pollinated material was sent to Knoxville for various studies. These lines will be continued with some revision.

Some 30 selfed lines of local interest were planted in the seed deterioration study conducted in cooperation with Mr. Simpson. These lines were self-pollinated and selections were made for planting in this study the coming season.

New lines of more recent origin than the other selfed lines are being maintained for breeding material.

A number of wilt-resistant lines have been planted in wilt-infested soil and selections have been made from only the disease-free plants. These lines will be continued.

A selfed-line exchange study composed of 64 strains collected from various parts of the Cotton Belt was made. Results from this test were sent to Beltsville, Maryland, for further study.

The fifteen leading strains in the Baton Rouge test show that local adaptation plays an important role in yields. Seven of the 15 leading strains here were from Louisiana selfed lines.

Some 60 strains including 30 selfed lines were planted and bolls were tagged at weekly intervals just as they opened. These tagged bolls were picked and marked for dates of tagging after two weeks' exposure to the weather. They were sent, along with the weather records for the period covered, to Mr. Simpson at Knoxville, Tennessee, for seed deterioration studies.

Considerable interest has been revived in the handcraft industries of South Louisiana. Chief among these projects is the weaving of homespun cloth with natural colored cotton. Several samples of brown cotton have been secured and it is planned to try to improve yields and fiber characters of these cottons by selection and crossing with other strains carrying a factor for brown color.—*John R. Cotton.*

## *Sweet Potato Disease Investigations*

Since the inception of the cooperative breeding program between the Division of Fruit and Vegetable Crops and Diseases of the United States Department of Agriculture and many of the horticultural departments of the agricultural experiment stations of the states within the sweet potato belt, a large number of sorts has been tested in the field, greenhouse, and hotbeds to determine their reaction to such diseases as soil rot, stem rot (wilt), and black rot. In addition, observations have been



made in the field on the presence of these diseases as well as others of less importance.

Three new varieties of sweet potato were included in the number that has been tested and they have been released recently for commercial use. They are Pelican Processor, Queen Mary and Ranger. These varieties are particularly interesting because they are the first ones of any commercial importance that have been derived from seed in the United States. The crosses which produced the seeds were made under the direction of Dr. J. C. Miller of the Horticultural Research Department of the Louisiana Experiment Station, where the breeding work is conducted for this cooperative breeding project.

The preceding varieties were tested for resistance to soil rot and stem rot (wilt) in soil that had been infested artificially with the causal organisms of these diseases. Separate fields, that were isolated from commercial plantings of sweet potatoes and did not drain in their vicinity, were used for each disease. The slips and vine-cuttings of the various sorts were inoculated by dipping them in spore suspensions of the causal organisms before they were planted, to prevent them from escaping infection. Similar tests were conducted in the greenhouse and hotbeds. Observations were also made on the prevalence of such diseases as white rust and leaf blight on the foliage of the sorts planted in the soil rot and stem rot fields. Records were made of the damage from scurf when the roots were harvested in the fall.

The results of the different tests and observations are summarized in the table entitled, "Reaction of Three New Varieties of Sweet Potato to Diseases."

An examination of the table on page 139 shows that the variety Pelican Processor is the only one found to be resistant to any of the diseases listed. It was demonstrated to be resistant to stem rot (wilt) in the field, as well as in greenhouse, tests. In fact, no external or internal symptoms of stem rot (wilt) have been observed so far in plants of this variety included in the field tests. Other investigators have also found this variety to be highly resistant in their field and greenhouse tests. Although it is a starch type and is one of the highest yielders of starch found so far, this variety is used as a parent in the breeding work to obtain resistance to stem rot (wilt) in sorts of the table type. This same variety was not found to be as susceptible to white rust as the other two varieties. It was classified as being only slightly susceptible to this disease.

The other two varieties, Queen Mary and Ranger, have a high carotene content and are used accordingly for table purposes. They were found to be very susceptible to such important diseases as stem rot (wilt) and soil rot, but were somewhat resistant to such minor diseases as white rust and leaf blight, being rated as moderately susceptible.



# REACTION OF THREE NEW VARIETIES OF SWEET POTATO TO DISEASES

Diseases (Causal Organisms)	Varieties		
	Pelican Processor	Queen Mary	Ranger
Soil Rot ( <i>Actinomyces ipomoea</i> Persons and Martin)	Very susceptible	Very susceptible	Very susceptible
Stem Rot (Wilt) ( <i>Fusarium batatas</i> Wr. and <i>F. hyperoxysporum</i> Wr.)	Resistant	Very susceptible	Very susceptible
Black Rot ( <i>Ceratostomella fimbriata</i> (E. and H.) Ell.)	Very susceptible	Very susceptible	Very susceptible
Scurf ( <i>Monilochaetes infuscans</i> Hals.)	.....	.....	Very susceptible
White Rust ( <i>Albugo ipomoeae</i> — <i>pandurana</i> (Schw.) SW.)	Slightly susceptible	Moderately susceptible	Moderately susceptible
Leaf Blight ( <i>Phyllosticta batatas</i> (Thum) Cke)	.....	Moderately susceptible	Moderately susceptible
End Rot ?( <i>Fusarium oxysporum</i> Schlecht)	.....	Very susceptible	.....

From tests conducted in the laboratory and observations made in the field, it was found that the three varieties—Pelican Processor, Queen Mary and Ranger—were very susceptible to black rot. In addition, the Queen Mary variety tended to be very susceptible in storage to end rot, which is probably caused by the fungus *Fusarium oxysporum* Schlecht.

—Theodore T. Ayers.

# Financial Statement--- Agricultural Research Funds

July 1, 1944 to July 1, 1945

## FEDERAL RESEARCH FUNDS

	<i>Hatch</i>	<i>Adams</i>	<i>Purnell</i>	<i>Bankhead-Jones</i>
Appropriations.....	\$15,000.00	\$15,000.00	\$60,000.00	\$56,502.80

## EXPENDITURES—FEDERAL FUNDS

Salaries and wages.....	\$14,009.15	\$13,932.22	\$49,258.28	\$45,073.39
Supplies and expense.....	574.59	442.21	7,139.17	5,555.30
Travel.....	312.02	308.57	2,151.77	2,252.06
Capital Outlay.....	104.24	317.00	1,450.78	3,622.05
TOTAL.....	\$15,000.00	\$15,000.00	\$60,000.00	\$56,502.80

## EXPENDITURES—STATE FUNDS

	<i>Bankhead-Jones Offset</i>	<i>State Non-offset</i>	<i>Other* State Funds</i>	<i>Research Fellowships</i>
Salaries.....	\$40,072.53	\$48,085.51	\$60,878.62	\$13,281.38
Wages.....	13,915.72	6,127.62	47,438.10	5,760.04
Supplies and Expense.....	11,931.00	8,730.27	46,867.44	3,513.80
Travel.....	2,607.43	2,300.29	7,869.18	3,207.38
Capital Outlay.....	1,745.40	3,051.35	20,088.69	3,050.95
TOTAL.....	\$70,272.08	\$68,295.04	\$183,142.03	\$28,813.55

\*Includes appropriations for sub-stations and special Legislative appropriations.

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<sup>e</sup>Raymond Webb, Research Associate in Horticulture  
J. L. Heath, Jr., B.S., Assistant in Animal Industry  
<sup>f</sup>John A. Baker, Farm Foreman

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### SOUTHEAST LOUISIANA STATION, FRANKLINTON

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T. P. Dykstra, Ph.D., Senior Pathologist  
Warren Whitcomb, Jr., Ph.D., Apiculturist, in Charge  
T. T. Ayers, Ph.D., Associate Pathologist  
John Cotton, M.S., Associate Agronomist  
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P. K. Harrison, M.S., Entomologist  
Otto Mackensen, Ph.D., Assistant Apiculturist  
K. L. Cockerham, M.S., Entomologist  
Oliver T. Deen, B.S., Entomologist  
Irwin L. Saveson, B.S., Drainage Engineer

<sup>a</sup> Part-time teaching

<sup>b</sup> On military leave

<sup>c</sup> Transferred

<sup>d</sup> On leave of absence

<sup>e</sup> Appointed after July 1, 1944

<sup>f</sup> Resigned

<sup>g</sup> On military leave, reported killed December 15, 1944

<sup>h</sup> On military leave, reported killed February 19, 1945

<sup>i</sup> Deceased













Det. Duc



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